

SK361  
A257f  
copy 1

P. O. F. I. LIBRARY

APR 13 1959

FISH & WILDLIFE SERVICE

#269  
D  
C  
B

# GULF OF MEXICO PLANKTON INVESTIGATIONS, 1951-53



SPECIAL SCIENTIFIC REPORT-FISHERIES No. 269

UNITED STATES DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE

### EXPLANATORY NOTE

The series embodies results of investigations, usually of restricted scope, intended to aid or direct management or utilization practices and as guides for administrative or legislative action. It is issued in limited quantities for official use of Federal, State or cooperating agencies and in processed form for economy and to avoid delay in publication.

United States Department of the Interior, Fred A. Seaton, Secretary  
Fish and Wildlife Service, Arnie J. Suomela, Commissioner

GULF OF MEXICO PLANKTON INVESTIGATIONS:  
1951-53

by

Edgar L. Arnold, Jr.  
Fishery Research Biologist  
Gulf Fishery Investigations  
Bureau of Commercial Fisheries  
Galveston, Texas

Special Scientific Report--Fisheries No. 269

Washington, D. C.  
November 1958

The Library of Congress has cataloged this publication as follows:

**Arnold, Edgar L**

Gulf of Mexico plankton investigations: 1951-53. Washington, U. S. Dept. of the Interior, Fish and Wildlife Service, 1958.

53 p. maps, diagr., tables. 27 cm. (U. S. Fish and Wildlife Service. Special scientific report: fisheries, no. 269)

| 1. Plankton—Mexico, Gulf of. | 1. Title. | (Series) |
|------------------------------|-----------|----------|
| SH11.A335 no. 269            | 574.923   | 59-60424 |
| Library of Congress          |           |          |

The Fish and Wildlife Service series, Special Scientific Report--Fisheries, is cataloged as follows:

**U. S. *Fish and Wildlife Service.***

Special scientific report: fisheries. no. 1-  
Washington, 1949-

no. illus., maps, diagrs. 27 cm.

Supersedes in part the Service's Special scientific report.

**1. Fisheries—Research.**

|                     |          |          |
|---------------------|----------|----------|
| SH11.A335           | 639.2072 | 59-60217 |
| Library of Congress | {2}      |          |

# FIGURES

| <u>No.</u> |                                                                                                                                                                                                                         | <u>Page</u> |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 1          | Subareas into which the Gulf of Mexico was divided for comparison of offshore plankton data . . . . .                                                                                                                   | 2           |
| 2          | Length frequencies by percent of larvae taken by a conventional half-meter silk net towed at one knot compared with those taken by the G-III sampler towed at 4 to 5 knots during Cruise 4-2A in January 1952 . . . . . | 3           |
| 3          | Location of plankton tows made during Cruise 1-1A, April-May 1951. Numbers identify stations . . . . .                                                                                                                  | 5           |
| 4          | Location of plankton tows made during Cruise 2-1B, June 1951. Numbers identify stations . . . . .                                                                                                                       | 7           |
| 5          | Location of plankton tows made during Cruise 3-1C, August 1951. Numbers identify stations . . . . .                                                                                                                     | 10          |
| 6          | Location of plankton tows made during Cruise 4-2C, January 1952. Numbers identify stations . . . . .                                                                                                                    | 15          |
| 7          | Location of plankton tows made during Cruise 5-2C, May-June 1952. Numbers identify stations . . . . .                                                                                                                   | 19          |
| 8          | Location of plankton tows made during Cruise 7 (Special), November 1952. Numbers identify stations . . . . .                                                                                                            | 27          |
| 9          | Location of plankton tows made during Cruise 8, February 1953, and Cruise 9 (Special), March 1953. Numbers identify stations . . . . .                                                                                  | 30          |
| 10         | Location of plankton tows made during Cruise 10-2B, April 1953. Numbers identify stations . . . . .                                                                                                                     | 36          |
| 11         | Location of plankton tows made during Cruise 11, May-June 1953. Numbers identify stations . . . . .                                                                                                                     | 42          |



# TABLES

| <u>No.</u> |                                                                                                                                                           | <u>Page</u> |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 1          | Station data, plankton volumes and numbers, Cruise 1-1A.<br>(Half-meter net, half-hour surface tows) . . . . .                                            | 6           |
| 2          | Station data, plankton volumes and numbers, Cruise 2-1B.<br>(Half-meter net, 15-minute and half-hour surface tows) . . .                                  | 8           |
| 3          | Station data, plankton volumes and numbers, Cruise 3-1C.<br>(Half-meter net, half-hour surface tows) . . . . .                                            | 11          |
| 4          | Station data, plankton volumes and numbers, Cruise 4-2A.<br>(Half-meter net, half-hour surface tows) . . . . .                                            | 13          |
| 5          | Station data, total volumes of plankton and volume of<br>fish larvae and eggs, Cruise 4-2A. (G-IA sampler; speed<br>of tows: 9-10 knots) . . . . .        | 16          |
| 6          | Station data, total volumes of plankton and volume of<br>fish larvae and eggs, Cruise 4-2A. (G-III sampler;<br>speed of tows: 4-5 knots) . . . . .        | 18          |
| 7          | Station data, total volumes of plankton and volume of<br>fish larvae and eggs, Cruise 5-2C. (G-IA sampler; speed<br>of tows: 9-10 knots) . . . . .        | 20          |
| 8          | Station data, total volumes of plankton and volume of<br>fish larvae and eggs, Cruise 5-2C. (G-III sampler;<br>speed of tows: 4-5 knots) . . . . .        | 24          |
| 9          | Station data, total volumes of plankton and volume of<br>fish larvae and eggs, Cruise 7 (Special). (G-IA sampler;<br>speed of tows: 9-10 knots) . . . . . | 28          |
| 10         | Station data, total volumes of plankton and volume of<br>fish larvae and eggs, Cruise 8. (G-IA sampler; speed<br>of tows: 9-10 knots) . . . . .           | 31          |
| 11         | Station data, total volumes of plankton and volume of<br>fish larvae and eggs, Cruise 8. (G-III sampler; speed<br>of tows: 4-5 knots) . . . . .           | 34          |
| 12         | Station data, total volumes of plankton and volume of<br>fish larvae and eggs, Cruise 9 and 10-2B. (G-IA<br>sampler; speed of tows: 9-10 knots) . . . . . | 37          |

| <u>No.</u> |                                                                                                                                               | <u>Page</u> |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 13         | Station data, total volumes of plankton and volume of fish larvae and eggs, Cruise 10-2B. (G-III sampler; speed of tows: 4-5 knots) . . . . . | 40          |
| 14         | Station data, total volumes of plankton and volume of fish larvae and eggs, Cruise 11. (G-IA sampler; speed of tows: 9-10 knots) . . . . .    | 43          |
| 15         | Station data, total volumes of plankton and volume of fish larvae and eggs, Cruise 11. (G-III sampler; speed of tows: 4-5 knots) . . . . .    | 45          |
| 16         | G-IA net (quantitative)                                                                                                                       |             |
|            | (a) Plankton volumes (ml./m <sup>3</sup> ) . . . . .                                                                                          | 47          |
|            | (B) Fish larvae (no./m <sup>3</sup> ) . . . . .                                                                                               | 48          |
|            | (C) Fish eggs (no./m <sup>3</sup> ) . . . . .                                                                                                 | 49          |
| 17         | G-III net (quantitative)                                                                                                                      |             |
|            | (A) Plankton volumes (ml./m <sup>3</sup> ) . . . . .                                                                                          | 50          |
|            | (B) Fish larvae (no./m <sup>3</sup> ) . . . . .                                                                                               | 51          |
|            | (C) Fish eggs (no./m <sup>3</sup> ) . . . . .                                                                                                 | 52          |
| 18         | Catches of G-IA and G-III nets compared, all seasons, all subareas . . . . .                                                                  | 53          |

## GULF OF MEXICO PLANKTON INVESTIGATIONS:

1951-53

The Gulf of Mexico, despite its economic importance, is one of the world's least known major bodies of water, in regard both to mass water movements and to the abundance, distribution, ranges, and life histories of many species of fishes found within its boundaries. With the exception of several cruises of the Blake and Mabel Taylor in the late 1880's, the relatively small accumulation of scientific knowledge was confined largely to inshore areas.

Although supporting a number of fisheries for many years, notably those for shrimp, snappers, oysters, and menhaden, the total fishery production of the Gulf has been considerably less than would normally be expected from an area of approximately 700,000 square miles. Recognizing the need for a more comprehensive general knowledge, it was decided to make a general oceanographic survey when the Gulf Fishery Investigations was established in the summer of 1950 at Galveston, Texas, by the Fish and Wildlife Service. The primary objective was to determine the spawning areas of various fishes. Studying the distribution of their eggs and larvae by means of plankton tows offered the best method for attaining this objective.

Data are presented in this report on the offshore plankton collections made in the Gulf from the M/V Alaska, research vessel of the Gulf Fishery Investigations. To aid in the comparison of data, the Gulf was divided arbitrarily into the eight sub-areas shown in figure 1 (see page 2). Ten cruises were made from March 1951 to July 1953. Originally it was planned to cover the entire Gulf annually in a series of three cruises, repeated each year. Unfortunately, the requisitioning of the Alaska for 24 weeks of sea-time disrupted the planned continuity.

As the distance between stations in the basic pattern (approximately 40 miles north and south, 100 miles east and west) seemed too great for obtaining representative plankton collections, I designed a sampler that could be towed at cruising speed between stations. It consisted essentially of a removable "Monel" wire-cloth

mesh net housed within a "Monel" tube. Details of construction are given in Fish and Wildlife Service Special Scientific Report--Fisheries No. 88. Designated as model G-IA, the sampler was fabricated and ready for use prior to the start of the second coverage of the Gulf (cruise 4-2A) in January 1952, and was operated successfully until inactivation of the Alaska in June 1953.

Continuing with the wire-cloth mesh principle, an all-metal net was designed and fabricated for making tows on station. Fundamentally a modified larger version of the G-IA model, this net was designated as model G-III, and is described in detail in the Special Scientific Report already cited.

It seemed logical to assume that the G-III sampler, towed for the same period of time at 4 to 5 knots, and with the same net opening, would catch substantially more plankton than a half-meter silk net, towed at one-fourth the speed. Moreover, we hoped that the increased speed, plus an opening unobstructed by a towing bridle, would result in the capture of the more agile planktonic forms.

Collecting operations in January 1952, during cruise 4-2A, afforded the first opportunity to compare the catching abilities of the G-III sampler and a conventional half-meter silk net. I used numbers and sizes of fish larvae <sup>1/</sup> as a basis for comparison.

Ten tows at 4 to 5 knots were made with the G-III sampler, 23 tows at approximately 1 knot were made with the half-meter net. All tows were of 30-minute duration. Both nets were fished horizontally, either at or within 10 meters of the surface. One G-III tow that yielded 959 larvae was considered atypical and was not used in the comparison. In the 9 remaining tows, the G-III net captured 1,334 fish larvae as

---

<sup>1/</sup> The term "larvae", used in this paper, includes all immature forms.

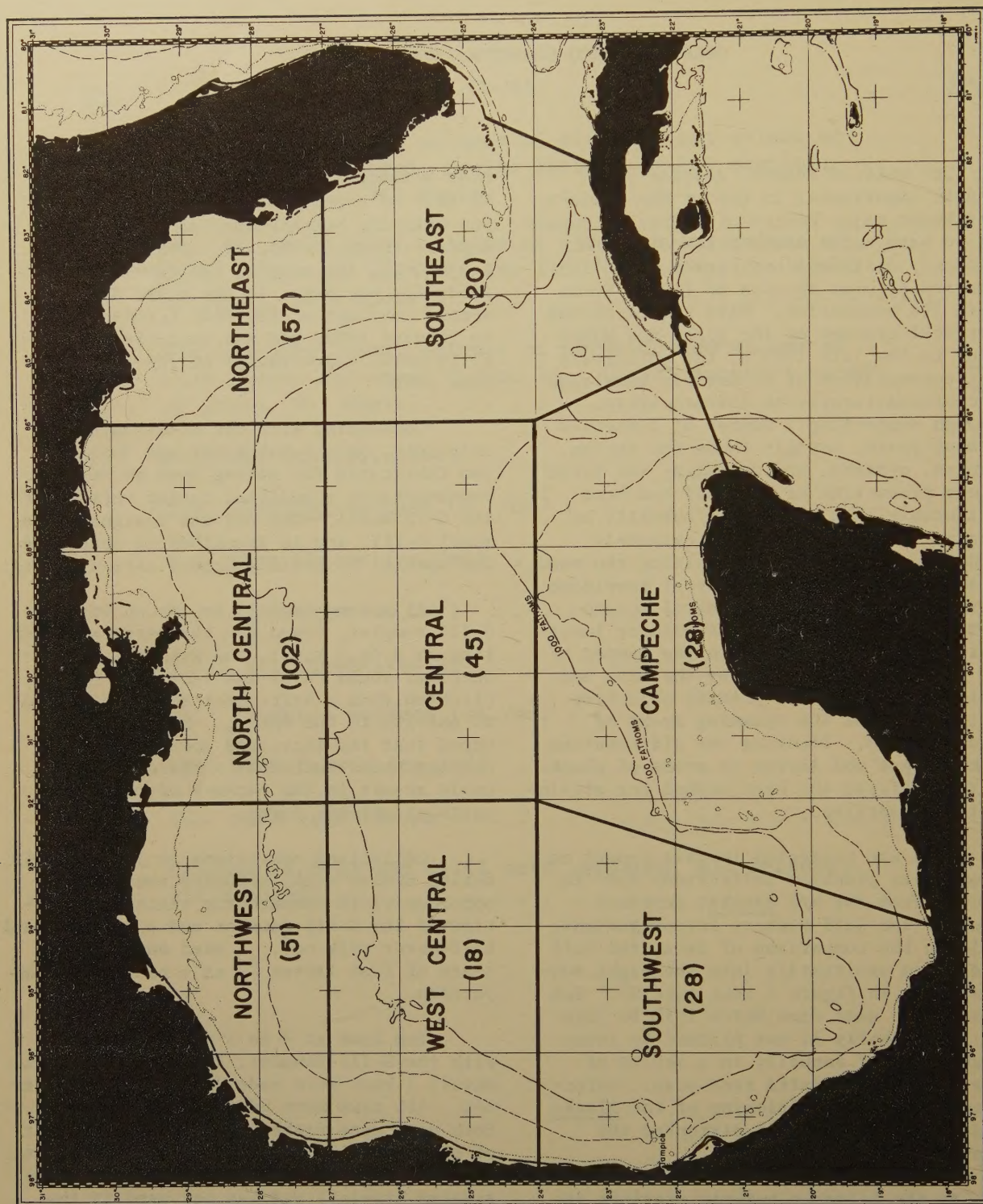


Figure 1.--Subareas into which the Gulf of Mexico was divided for comparison of offshore plankton data. Numbers in parenthesis represent the number of plankton tows made in each area.

compared to 414 larvae taken in 23 tows of the silk net. As shown in figure 2, the G-III samples contained larger specimens, as well as over three times the number of larvae. Contrary to what might be expected from the much greater towing speed and metal meshes of the G-III net, I found no difference in the condition of the catches of the two nets.

As a result of these findings and because of its other advantages (durability and ease of cleaning), the G-III sampler was used exclusively on subsequent cruises.

During the period of field work aboard the Alaska, a total of 449 tows were made with different types of gear, as follows:

Half-meter No. 10

silk net . . . . . 94 tows

One-meter No. 10 silk net. . . 9 tows

G-III Monel net No. 1

mesh . . . . . 131 tows

G-IA Monel net No. 1 mesh. . 215 tows

Samples were first sorted for fish eggs and larvae. Prior to volume determination all gross forms (medusae, sargassum weed, etc.) were removed.

Volumes were obtained after the first four cruises by the following procedure:

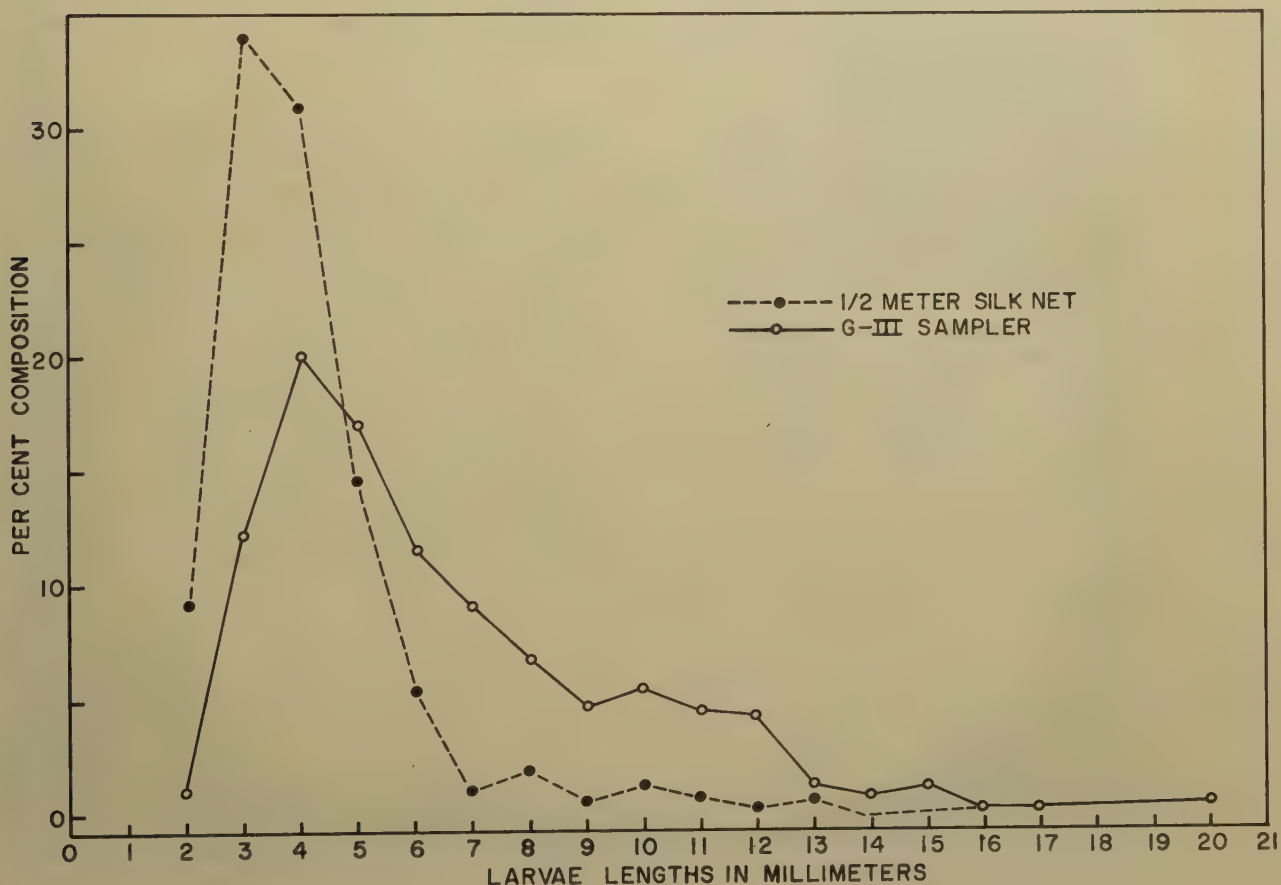


Figure 2.--Length frequencies by percent of larvae taken by a conventional half-meter silk net towed at one knot compared with those taken by the G-III sampler towed at 4 to 5 knots during Cruise 4-2A in January 1952.

1. Sample poured into graduate cylinder and reading noted to nearest milliliter.
2. Solution separated from plankton by force-filtering solution through a No. 1 Wratten disc filter by means of a vacuum-pump attachment.
3. Filtrate poured back into graduate and reading noted.
4. Volume is difference between the two readings.

For the first four cruises, however, we determined volumes by fractioning and centrifuging. To adjust these values to conform with those obtained by filtration, we ran, in duplicate, a series of plankton samples of different volume ranges through both methods to obtain the necessary conversion factors. All plankton volumes given in the tables are based on the first method described.

The volumes of water strained, as tabulated, were calculated from readings of the four Atlas current meters which were used throughout the Alaska cruises. As two meters were used with the G-III net on only one cruise, the readings for all quantitative hauls of this net were based on readings from the rear meter. Calibrations of the meters were obtained upon completion of field work by making duplicate tows in opposite directions at different speeds over a 4,500-foot course in calm water. The results of these calibrating runs which were used in the present report are as follows:

| <u>Meter No.</u> | <u>Liters per revolution</u> |
|------------------|------------------------------|
| 109              | 3.604                        |
| 112              | 3.190                        |
| 175              | 2.821                        |
| 176              | 2.575                        |

The following tables of data and their accompanying charts are tabulated according to gear and cruise. G-III hauls are numbered according to station. The results of G-III oblique hauls during cruise 5-2C (table 8) are in the same order of magnitude as those of horizontal tows, and thus received no special treatment.

In spite of the diversity of towing techniques and gear, the distribution of plankton by volume revealed a distinct pattern (tables 16 and 17), with the greater abundance appearing in catches made over the Continental Shelf.

In table 18 the catches of the two metal nets are compared on a quantitative basis. The G-III net, with its half-meter opening, caught substantially more of the active swimmers, but both models captured inactive forms (eggs) in nearly the same ratio. The table also points out the abrupt decrease in plankton abundance as the vessel moved seaward from waters over the Continental Shelf.

In considering the data presented in this report, it should be kept in mind that because of the emphasis placed on hydrography during the survey, and the relatively deep draft of the Alaska, few stations were taken in shallow water. Limited plankton collections subsequently made in shallow waters from smaller vessels in the vicinity of Galveston Island revealed a much higher concentration of plankton, especially in numbers of fish larvae, than appeared in the Alaska catches from farther offshore. It is probable, therefore, that intensive shallow-water collecting would reveal a higher potential of biological productivity for the inshore area of the Gulf than may be inferred from these tables.



Figure 3.--Location of plankton tows made during Cruise 1-1A, April-May, 1951.  
Numbers identify stations.

Table 1.--Station data, plankton volumes and numbers, Cruise 1-1A.  
(Half-meter net, half-hour surface tows)

| Station | Position |          | Sub-<br>Area | Date<br>1951 | Time (start)<br>G. S. T. | Plankton       |                |              |
|---------|----------|----------|--------------|--------------|--------------------------|----------------|----------------|--------------|
|         | N. Lat.  | W. Long. |              |              |                          | Volume<br>(ml) | Fish<br>larvae | Fish<br>eggs |
| 3       | 26-08    | 90-05    | C            | IV-22        | 0100                     | 5.0            | 26             | 0            |
| 4       | 25-20    | 90-07    | C            | IV-22        | 2000                     | 8.0            | 0              | 7            |
| 5       | 24-40    | 90-07    | C            | IV-23        | 1110                     | 14.5           | 27             | 6            |
| 7       | 23-15    | 90-00    | Ca           | IV-24        | 0345                     | 14.0           | 67             | 7            |
| 8       | 22-25    | 90-00    | Ca           | IV-24        | 1032                     | 17.0           | 136            | 19           |
| 9       | 21-25    | 90-00    | Ca           | IV-24        | 1920                     | 4.5            | 32             | 68           |
| 10      | 22-30    | 88-46    | Ca           | IV-25        | 1300                     | 9.0            | 69             | 42           |
| 11      | 22-30    | 88-00    | Ca           | IV-25        | 2145                     | 15.0           | 155            | 78           |
| 12      | 22-30    | 87-14    | Ca           | IV-26        | 0600                     | 4.0            | 60             | 97           |
| 13      | 22-30    | 86-25    | Ca           | IV-26        | 1429                     | 2.5            | 6              | 9            |
| 15      | 22-30    | 85-25    | Ca           | IV-27        | 0830                     | 3.0            | 4              | 5            |
| 17      | 22-28    | 84-45    | SE           | IV-27        | 1945                     | 1.5            | 2              | 1            |
| 20      | 23-28    | 84-32    | SE           | IV-28        | 0940                     | 41.0           | 2              | 0            |
| 23      | 23-11    | 82-24    | SE           | IV-29        | 0855                     | 2.5            | 5              | 13           |
| 27      | 24-22    | 82-24    | SE           | V-3          | 1910                     | 26.4           | 30             | 2            |
| 29      | 24-18    | 83-53    | SE           | V-4          | 1000                     | 11.5           | 4              | 6            |
| 31      | 24-22    | 84-44    | SE           | V-4          | 2200                     | 10.0           | 1              | 0            |
| 32      | 24-22    | 85-31    | SE           | V-5          | 0840                     | 4.5            | 1              | 0            |
| 33      | 24-25    | 87-14    | C            | V-6          | 0020                     | 11.5           | 42             | 8            |
| 35      | 25-09    | 88-00    | C            | V-6          | 1340                     | 9.0            | 15             | 127          |
| 37      | 26-22    | 87-55    | C            | V-7          | 0355                     | 23.5           | 18             | 5            |
| 39      | 28-09    | 88-00    | NC           | V-7          | 2220                     | 21.0           | 56             | 0            |
| 41      | 28-13    | 89-49    | NC           | V-8/9        | 2350                     | 18.0           | 75             | 7            |
| 42A     | 28-30    | 93-00    | NW           | V-10         | 0815                     | 31.6           | 52             | 8            |

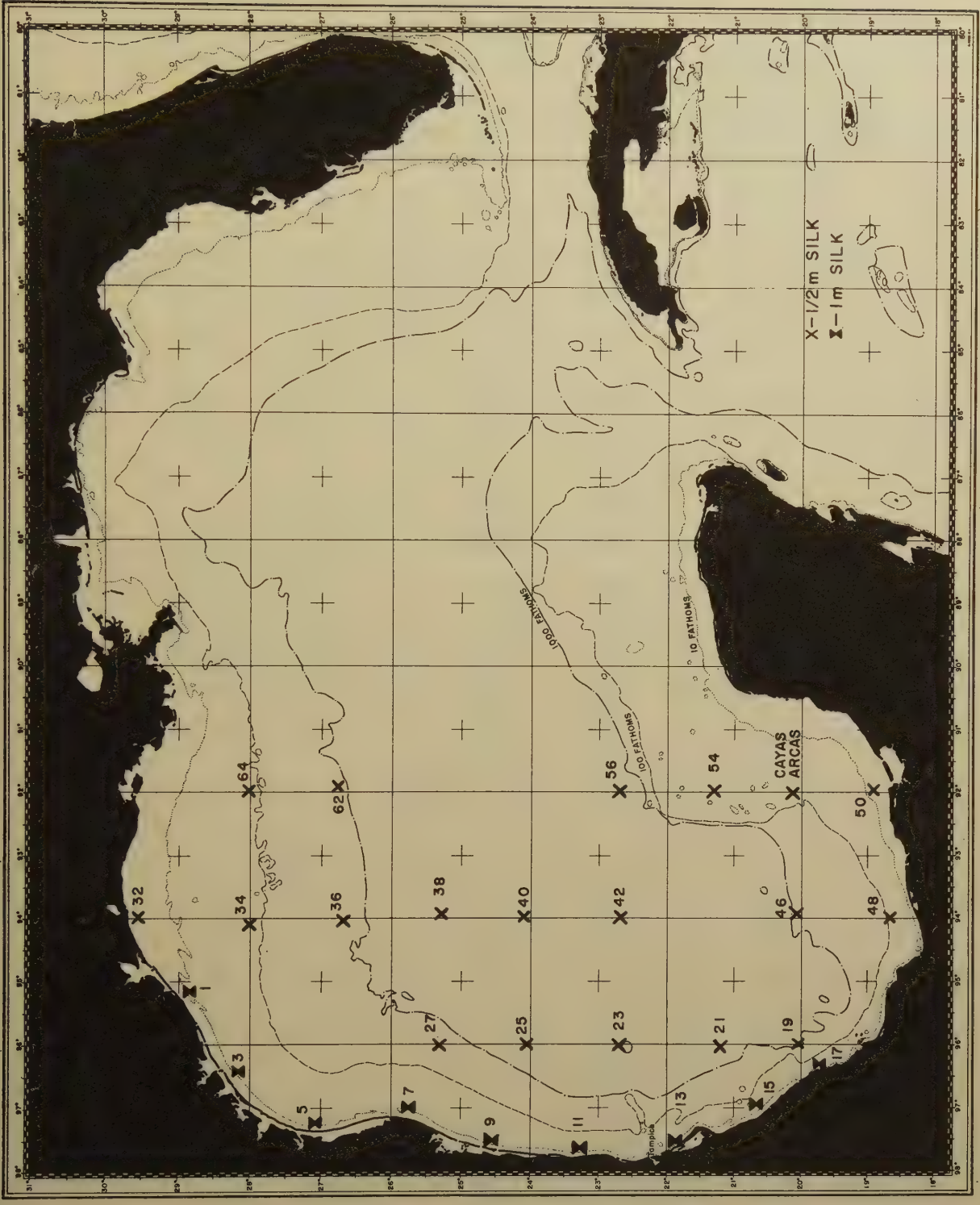


Figure 4.--Location of plankton tows made during Cruise 2-1B, June 1951.  
Numbers identify stations.

Table 2.--Station data, plankton volumes and numbers, Cruise 2-1B.  
(Half-meter net, 15-minute and half-hour surface tows)

Half-meter net, 15-minute surface tows.

| Station | Position |          | Sub-Area | Date 1951 | Time (start)<br>G. S. T. | Plankton       |             |           |
|---------|----------|----------|----------|-----------|--------------------------|----------------|-------------|-----------|
|         | N. Lat.  | W. Long. |          |           |                          | Volume<br>(ml) | Fish Larvae | Fish Eggs |
| 1       | 28-51    | 95-12    | NW       | VI-4      | 2245*                    | 576.0          | 0           | 725       |
| 3       | 28-09    | 96-26    | NW       | VI-5      | 0932                     | 32.4           | 4           | 105       |
| 5       | 27-04    | 97-16    | NW       | VI-5      | 1940                     | 94.7           | 2178        | 414       |
| 7       | 25-45    | 97-00    | WC       | VI-6      | 0635                     | 77.0           | 43          | 87        |
| 9       | 24-33    | 97-31    | WC       | VI-6      | 1755                     | 57.4           | 596         | 3368      |
| 11      | 23-18    | 97-38    | SW       | VI-7      | 0505                     | 49.7           | 213         | 458       |
| 13      | 21-53    | 97-34    | SW       | VI-7      | 1840                     | 59.5           | 185         | 945       |
| 15      | 20-41    | 96-58    | SW       | VI-8      | 0726                     | 575.0          | 24          | 86        |
| 17      | 19-43    | 96-20    | SW       | VI-8      | 1756                     | 59.5           | 143         | 202       |

\* 30 minutes

Half-meter net, half-hour surface tows.

|    |       |       |    |       |       |      |     |    |
|----|-------|-------|----|-------|-------|------|-----|----|
| 19 | 20-02 | 96-00 | SW | VI-9  | 0810  | 5.5  | 11  | 58 |
| 21 | 21-15 | 96-01 | SW | VI-9  | 2345  | 25.9 | 10  | 8  |
| 23 | 22-42 | 96-00 | SW | VI-10 | 1700  | 25.9 | 9   | 28 |
| 25 | 24-03 | 96-01 | WC | VI-11 | 0800  | 3.5  | 12  | 14 |
| 27 | 25-20 | 96-00 | WC | VI-11 | 2255* | 25.5 | 10  | 25 |
| 32 | 29-34 | 94-00 | NW | VI-19 | 0200* | 92.3 | 588 | 39 |
| 34 | 28-00 | 94-07 | NW | VI-19 | 1515  | 21.0 | 10  | 34 |

TABLE 2 (Continued)

| Station     | Position |          | Sub-<br>Area | Date<br>1951 | Time (start)<br>C. S. T. | Plankton       |             |           |
|-------------|----------|----------|--------------|--------------|--------------------------|----------------|-------------|-----------|
|             | N. Lat.  | W. Long. |              |              |                          | Volume<br>(ml) | Fish Larvae | Fish Eggs |
| 36          | 26-41    | 94-04    | WC           | VI-20        | 0630                     | 15.0           | 14          | 5         |
| 38          | 25-17    | 93-58    | WC           | VI-21        | 0625                     | 15.5           | 11          | 1         |
| 40          | 24-05    | 94-00    | WC           | VI-22        | 0405*                    | 25.9           | 31          | 0         |
| 42          | 22-40    | 94-00    | SW           | VI-22        | 2220                     | 31.6           | 42          | 14        |
| 46          | 20-04    | 93-57    | SW           | VI-24        | 2020                     | 25.5           | 22          | 0         |
| 48          | 18-40    | 94-00    | SW           | VI-25        | 0830                     | 3.0            | 18          | 32        |
| 50          | 18-55    | 91-57    | Ca           | VI-26        | 0855                     | 72.1           | 101         | 65        |
| Cayas Arcas | 20-10    | 92-00    | Ca           | VI-27        | 0720                     | 32.8           | 133         | 980       |
| 54          | 21-20    | 91-58    | Ca           | VI-27        | 1710                     | 313.0          | 21          | 218       |
| 56          | 22-40    | 92-00    | Ca           | VI-28        | 0640                     | 15.0           | 9           | 9         |
| 62          | 26-46    | 91-55    | C            | VI-29        | 1340                     | 20.0           | 27          | 14        |
| 64          | 28-00    | 92-00    | NW           | VI-30        | 0030                     | 66.2           | 51          | 138       |

\*15 minutes



Figure 5.--Location of plankton tows made during Cruise 3-1C, August 1951.  
Numbers identify stations.

Table 3.--Station data, plankton volumes and numbers, Cruise 3-1C.  
(Half-meter net, half-hour surface tows)

| Station | Position |          | Sub-<br>Area | Date<br>1951 | Time (start)<br>C. S. T. | Plankton       |             |           |
|---------|----------|----------|--------------|--------------|--------------------------|----------------|-------------|-----------|
|         | N. Lat.  | W. Long. |              |              |                          | Volume<br>(ml) | Fish Larvae | Fish Eggs |
| 1       | 28-53    | 89-00    | NC           | VIII-10      | 0300                     | 68.6           | 21          | 4         |
| 2       | 29-33    | 88-23    | NC           | VIII-10      | 0945                     | 91.6           | 3           | 10        |
| 3       | 29-00    | 88-01    | NC           | VIII-11      | 2213                     | 314.0          | 0           | 0         |
| 4       | 28-41    | 87-30    | NC           | VIII-12      | 0805                     | 57.4           | 15          | 62        |
| 5       | 28-00    | 87-12    | NC           | VIII-12      | 1810                     | 33.3           | 2           | 0         |
| 6       | 27-27    | 86-33    | NC           | VIII-13      | 0720                     | 52.5           | 8           | 18        |
| 7       | 26-59    | 86-01    | SE           | VIII-13      | 2135                     | 45.6           | 12          | 1         |
| 8       | 26-29    | 85-29    | SE           | VIII-14      | 0940                     | 47.1           | 12          | 4         |
| 9       | 26-00    | 85-00    | SE           | VIII-15      | 0225                     | 36.5           | 15          | 1         |
| 10      | 26-10    | 84-22    | SE           | VIII-15      | 0755                     | 29.6           | 19          | 88        |
| 11      | 26-09    | 83-50    | SE           | VIII-15      | 1340                     | 28.7           | 7           | 49        |
| 12      | 26-31    | 83-10    | SE           | VIII-16      | 2045                     | 28.5           | 52          | 471       |
| 13      | 26-39    | 82-31    | SE           | VIII-17      | 0240                     | 59.4           | 78          | 38        |
| 14      | 27-18    | 82-58    | NE           | VIII-17      | 1050                     | 20.0           | 30          | 83        |
| 15      | 27-38    | 83-51    | NE           | VIII-17      | 1755                     | 34.2           | 15          | 13        |
| 16      | 27-42    | 84-51    | NE           | VIII-18      | 0100                     | 32.0           | 11          | 20        |
| 17      | 28-15    | 84-41    | NE           | VIII-18      | 0635                     | 36.5           | 19          | 38        |
| 18      | 29-03    | 84-27    | NE           | VIII-18      | 1350                     | 2.5            | 5           | 6         |
| 20      | 29-11    | 85-07    | NE           | VIII-18      | 1855                     | 22.0           | 20          | 115       |

TABLE 3 (Continued)

| Station | Position |          | Sub-<br>Area | Date<br>1951 | Time (start)<br>C. S. T. | Plankton       |             |           |
|---------|----------|----------|--------------|--------------|--------------------------|----------------|-------------|-----------|
|         | N. Lat.  | W. Long. |              |              |                          | Volume<br>(ml) | Fish Larvae | Fish Eggs |
| 21      | 28-46    | 85-46    | NE           | VIII-19      | 0210                     | 58.0           | 5           | 12        |
| 22      | 29-26    | 85-45    | NE           | VIII-19      | 0750                     | 75.1           | 4           | 87        |
| 23      | 30-06    | 85-45    | NE           | VIII-19      | 1240                     | 12.5           | 60          | 42        |
| 24      | 29-43    | 86-10    | NC           | VIII-20      | 1230                     | 143.0          | 5           | 8         |
| 25      | 29-30    | 86-28    | NC           | VIII-20      | 1558                     | 31.9           | 0           | 0         |
| 26      | 29-57    | 86-50    | NC           | VIII-20      | 1930                     | 360.0          | 1           | 0         |
| 27      | 30-15    | 87-17    | NC           | VIII-21      | 0055                     | 294.5          | 31          | 16        |

Table 4.--Station data, plankton volumes and numbers, Cruise 4-2A.  
(Half-meter net, half-hour surface tows)

| Station | Position |          | Sub-<br>Area | Date<br>1952 | Time (start)<br>C. S. T. | Plankton       |             |           |
|---------|----------|----------|--------------|--------------|--------------------------|----------------|-------------|-----------|
|         | N. Lat.  | W. Long. |              |              |                          | Volume<br>(ml) | Fish Larvae | Fish Eggs |
| 1       | 26-46    | 92-00    | WC           | I-9          | 1800                     | 6.0            | 0           | 1         |
| 6       | 24-48    | 90-06    | C            | I-11         | 0900                     | 2.4            | 1           | 2         |
| 7       | 24-17    | 89-37    | C            | I-11         | 2200                     | 4.8            | 10          | 3         |
| 8       | 23-46    | 88-55    | Ca           | I-12         | 0635                     | 5.0            | 29          | 3         |
| 9       | 23-20    | 88-23    | Ca           | I-12         | 1355                     | 7.2            | 32          | 2         |
| 10      | 22-47    | 88-00    | Ca           | I-12         | 1945                     | 3.5            | 13          | 8         |
| 11      | 22-20    | 87-31    | Ca           | I-13         | 0135                     | 7.0            | 7           | 40        |
| 12      | 21-52    | 87-05    | Ca           | I-13         | 0815                     | 2.4            | 11          | 0         |
| 14      | 21-35    | 86-27    | Ca           | I-13         | 2055                     | 10.0           | 18          | 1         |
| 15      | 21-45    | 86-05    | Ca           | I-14         | 0245                     | 2.6            | 16          | 0         |
| 16      | 21-52    | 85-36    | Ca           | I-14         | 0915                     | 2.0            | 3           | 1         |
| 17      | 21-54    | 85-23    | Ca           | I-14         | 1435                     | 2.4            | 0           | 0         |
| 18A     | 22-01    | 85-00    | SE           | I-15         | 1130                     | 4.0            | 2           | 1         |
| 19      | 22-16    | 84-54    | SE           | I-15         | 1945                     | 9.0            | 3           | 1         |
| 22      | 24-10    | 84-11    | SE           | I-16         | 2250                     | 9.0            | 18          | 0         |
| 23      | 24-40    | 83-52    | SE           | I-17         | 0450                     | 10.0           | 11          | 2         |
| 30      | 23-13    | 82-22    | SE           | I-20         | 0530                     | 8.0            | 44          | 10        |
| 31      | 23-16    | 83-11    | SE           | I-22         | 1330                     | 5.4            | 0           | 0         |

TABLE 4 (Continued)

| Station | Position |          | Sub-<br>Area | Date<br>1952 | Time (start)<br>C. S. T. | Plankton       |             |           |
|---------|----------|----------|--------------|--------------|--------------------------|----------------|-------------|-----------|
|         | N. Lat.  | W. Long. |              |              |                          | Volume<br>(ml) | Fish Larvae | Fish Eggs |
| 33      | 23-32    | 84-33    | SE           | I-23         | 0248                     | 12.0           | 32          | 6         |
| 39      | 25-37    | 86-14    | C            | I-25         | 0610                     | 12.0           | 73          | 3         |
| 40      | 26-07    | 86-06    | C            | I-25         | 1500                     | 4.0            | 2           | 0         |
| 41      | 27-01    | 85-58    | NE           | I-26         | 0000                     | 12.0           | 87          | 3         |
| 43      | 28-11    | 86-00    | NE           | I-26         | 1515                     | 7.0            | 0           | 6         |
| 44      | 28-12    | 86-45    | NC           | I-26         | 2318                     | 12.1           | 25          | 7         |
| 45      | 28-03    | 87-27    | NC           | I-27         | 0638                     | 8.0            | 31          | 5         |



Figure 6.--Location of plankton tows made during Cruise 4-2A, January 1952.  
Numbers identify stations.

Table 5.--Station data, total volumes of plankton and volume of fish larvae and eggs, Cruise 4-2A.  
(G-1A sampler; speed of tows: 9-10 knots)

| Tow | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1952 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Plankton                                |                                       |
|-----|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. Lat.                           | W. Long. |              |              |                  |                      |                                            |                |                                   | Fish larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 1   | 27-22                             | 92-43    | NW           | I-9          | 0950-1250        | 5-6                  | 88.95                                      | 0.2            | .002                              | .022                                    | .000                                  |
| 2   | 26-37                             | 91-50    | NW           | I-9          | 1825-2225        | 3-4                  | 123.83                                     | 2.0            | .016                              | .000                                    | .000                                  |
| 3   | 24-30                             | 89-52    | C            | I-11         | 0910-1410        | 5                    | 151.00                                     | 1.0            | .007                              | .040                                    | .026                                  |
| 4   | 23-38                             | 88-44    | Ca           | I-12         | 0630-0920        | 6                    | 89.81                                      | 0.9            | .010                              | .022                                    | .089                                  |
| 5   | 23-03                             | 88-13    | Ca           | I-12         | 1355-1805        | 6                    | 122.45                                     | 2.0            | .016                              | .073                                    | .098                                  |
| 6   | 22-33                             | 87-44    | Ca           | I-12         | 1955-0000        | 5-6                  | 125.65                                     | 2.0            | .016                              | .000                                    | .000                                  |
| 10  | 21-40                             | 86-15    | Ca           | I-13         | 2050-2330        | 3                    | 65.49                                      | 1.0            | .012                              | .031                                    | .000                                  |
| 11  | 21-53                             | 85-30    | Ca           | I-14         | 0925-1115        | 6                    | 51.81                                      | 0.8            | .015                              | .000                                    | .000                                  |
| 12  | 21-54                             | 85-13    | Ca           | I-14         | 1435-1640        | 6                    | 55.83                                      | 1.0            | .018                              | .000                                    | .000                                  |
| 13  | 22-06                             | 84-59    | SE           | I-15         | 1438-1710        | 7                    | 59.68                                      | 0.8            | .013                              | .000                                    | .000                                  |
| 14  | 22-29                             | 84-50    | SE           | I-15         | 2005-2245        | 2-3                  | 60.19                                      | 1.0            | .017                              | .000                                    | .000                                  |
| 15  | 23-50                             | 84-24    | SE           | I-16         | 1520-1950        | 3                    | 90.76                                      | 0.8            | .009                              | .000                                    | .000                                  |
| 16  | 24-32                             | 83-15    | SE           | I-17         | 0820-1005        | 6                    | 36.11                                      | 0.8            | .022                              | .000                                    | .000                                  |
| 17  | 24-20                             | 82-23    | SE           | I-17         | 1320-1740        | 7                    | 87.65                                      | 3.0            | .034                              | .103                                    | .000                                  |
| 18  | 24-24                             | 82-10    | SE           | I-19         | 0620-0920        | 4                    | 53.38                                      | 4.2            | .079                              | .225                                    | .094                                  |

TABLE 5 (Continued)

| Tow | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1952 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|-----|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. Lat.                           | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 19  | 24-00                             | 82-23    | SE           | I-19         | 1500-1700        | 10                   | 37.42                                      | 2.0            | .053                              | .134                                    | .000                                  |
| 20  | 23-17                             | 82-50    | SE           | I-22         | 0728-1100        | 10                   | 50.09                                      | 2.0            | .040                              | .040                                    | .000                                  |
| 21  | 23-20                             | 83-32    | SE           | I-22         | 1435-1735        | 9                    | 61.70                                      | 1.2            | .194                              | .000                                    | .000                                  |
| 22  | 23-30                             | 84-58    | SE           | I-23         | 0247-0647        | 2-3                  | 63.77                                      | 4.0            | .063                              | .078                                    | .000                                  |
| 23  | 23-30                             | 85-38    | SE           | I-23         | 1020-1420        | 9                    | 58.89                                      | 2.5            | .042                              | .034                                    | .000                                  |
| 25  | 23-36                             | 86-40    | Ca           | I-24         | 0135-0345        | 2                    | 45.83                                      | 6.0            | .131                              | .567                                    | .087                                  |
| 27  | 26-42                             | 86-00    | C            | I-25         | 1720-2120        | 2                    | 90.17                                      | 2.4            | .027                              | .055                                    | .000                                  |
| 28  | 27-18                             | 85-55    | NE           | I-26         | 0025-0430        | 2                    | 88.66                                      | 5.0            | .056                              | .034                                    | .011                                  |
| 29  | 27-54                             | 85-55    | NE           | I-26         | 0940-1315        | 7-8                  | 79.40                                      | 2.0            | .025                              | .025                                    | .025                                  |
| 30  | 28-11                             | 86-25    | NC           | I-26         | 1550-1925        | 6                    | 80.01                                      | 2.5            | .031                              | .137                                    | .000                                  |
| 31  | 28-06                             | 87-05    | NC           | I-27         | 2345-0400        | 6                    | 88.49                                      | 12.0           | .136                              | .057                                    | .011                                  |
| 32  | 28-00                             | 87-55    | NC           | I-27         | 0708-1120        | 9-10                 | 90.58                                      | 4.2            | .046                              | .132                                    | .022                                  |
| 33  | 28-09                             | 88-50    | NC           | I-27         | 1745-1935        | 3-4                  | 36.15                                      | 4.5            | .124                              | .221                                    | .083                                  |
| 34  | 28-51                             | 94-04    | NW           | I-29         | 0745-1130        | 8                    | 101.18                                     | 4.2            | .042                              | .208                                    | .283                                  |

Table 6.--Station data, total volumes of plankton and volume of fish larvae and eggs, Cruise 4-2A.  
(G-III sampler; speed of tows: 4-5 knots)

| Sta-<br>tion | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1952 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|--------------|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|              | N. Lat.                           | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish Larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 21           | 23-33                             | 84-31    | SE           | I-16         | 1425-1455        | 3                    | 271.43                                     | 14.0           | .052                              | .181                                    | .007                                  |
| 25           | 24-33                             | 83-04    | SE           | I-17         | 1105-1135        | 10                   | 240.71                                     | 34.7           | .144                              | 3.984                                   | 1.998                                 |
| 26           | 24-25                             | 82-25    | SE           | I-19         | 1100-1130        | 10                   | 187.20                                     | 35.7           | .190                              | 1.661                                   | .000                                  |
| 27           | 24-15                             | 82-24    | SE           | I-19         | 1415-1445        | 10                   | 181.55                                     | 55.1           | .304                              | 1.636                                   | .005                                  |
| 28           | 23-49                             | 82-19    | SE           | I-19         | 1920-1950        | 1                    | 276.38                                     | 27.2           | .098                              | .586                                    | .003                                  |
| 29           | 23-34                             | 82-21    | SE           | I-19         | 2320-2350        | 1                    | 256.60                                     | 28.6           | .112                              | .203                                    | .003                                  |
| 32           | 23-25                             | 83-54    | SE           | I-22         | 1943-2013        | 1                    | 276.60                                     | 24.0           | .087                              | .127                                    | .000                                  |
| 35           | 23-31                             | 85-59    | Ca           | I-23         | 1712-1742        | 3                    | 215.45                                     | 30.4           | .141                              | .427                                    | .042                                  |
| 36           | 23-30                             | 86-42    | Ca           | I-24         | 0058-0128        | 1                    | 140.04                                     | 47.9           | .341                              | 2.056                                   | .021                                  |
| 42           | 27-36                             | 85-46    | NE           | I-26         | 0855-0925        | 3                    | 277.04                                     | 28.0           | .101                              | .220                                    | .036                                  |



Figure 7.--Location of plankton tows made during Cruise 5-2C, May-June 1952.  
Numbers identify stations.

Table 7.--Station data, total volumes of plankton and volume of fish larvae and eggs, Cruise 5-2C.  
(G-IA sampler; speed of tows: 9-10 knots)

| Tow | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1952 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|-----|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. Lat.                           | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 1   | 28-42                             | 91-40    | NC           | V-21         | 0625-1025        | 8                    | 138.66                                     | 3.7            | .027                              | .195                                    | .007                                  |
| 2   | 28-35                             | 91-01    | NC           | V-21         | 1038-1538        | 8                    | 105.13                                     | 6.4            | .061                              | .504                                    | .304                                  |
| 3   | 28-29                             | 90-24    | NC           | V-21         | 1605-1808        | 8                    | 50.10                                      | 22.5           | .449                              | .858                                    | .279                                  |
| 4   | 28-22                             | 89-26    | NC           | V-22         | 0140-0525        | 4                    | 81.64                                      | 2.8            | .034                              | .061                                    | .000                                  |
| 5   | 29-52                             | 87-29    | NC           | V-24         | 0220-0520        | 3                    | 65.38                                      | 15.0           | .229                              | .811                                    | .000                                  |
| 6   | 29-23                             | 87-29    | NC           | V-24         | 0641-0921        | 10                   | 57.29                                      | 6.4            | .112                              | .733                                    | .017                                  |
| 7   | 28-53                             | 87-29    | NC           | V-24         | 1220-1503        | 10                   | 118.15                                     | 5.6            | .047                              | .195                                    | .000                                  |
| 8   | 28-20                             | 87-30    | NC           | V-24         | 1800-2100        | 8                    | 101.05                                     | 6.4            | .063                              | .020                                    | .049                                  |
| 9   | 27-46                             | 87-31    | NC           | V-25         | 0210-0610        | 8                    | 133.99                                     | 14.9           | .111                              | .530                                    | .030                                  |
| 10  | 26-58                             | 87-31    | NC           | V-25         | 1100-1400        | 12                   | 100.75                                     | 2.4            | .024                              | .109                                    | .010                                  |
| 12  | 25-38                             | 87-39    | C            | V-26         | 0210-0605        | 7                    | 145.39                                     | 4.8            | .033                              | .172                                    | .000                                  |
| 13  | 25-03                             | 87-18    | C            | V-26         | 0955-1355        | 12                   | 139.13                                     | 1.6            | .012                              | .165                                    | .000                                  |
| 14  | 24-40                             | 86-42    | C            | V-26         | 1725-2115        | 12                   | 148.16                                     | 16.0           | .108                              | .162                                    | .074                                  |
| 15  | 24-12                             | 86-12    | C            | V-27         | 0040-0500        | 5                    | 155.04                                     | 20.8           | .134                              | .310                                    | .032                                  |

TABLE 7 (Continued)

| Tow | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1952 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|-----|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. Lat.                           | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 16  | 23-41                             | 85-42    | SE           | V-27         | 0830-1320        | 12                   | 168.24                                     | 1.2            | .007                              | .065                                    | .006                                  |
| 17  | 23-11                             | 85-08    | SE           | V-27         | 1725-2030        | 13                   | 145.92                                     | 4.0            | .027                              | .144                                    | .000                                  |
| 18  | 22-45                             | 84-42    | SE           | V-27/28      | 2315-0400        | 5                    | 172.63                                     | 1.6            | .009                              | .075                                    | .041                                  |
| 19  | 22-13                             | 84-48    | SE           | V-28         | 0645-1115        | 13                   | 161.10                                     | 2.4            | .015                              | .068                                    | .012                                  |
| 20  | 22-45                             | 84-57    | SE           | V-28         | 1600-1800        | 13                   | 90.50                                      | 0.5            | .006                              | .000                                    | .000                                  |
| 21  | 23-13                             | 84-58    | SE           | V-28         | 2037-2330        | 5                    | 102.03                                     | 5.6            | .055                              | .059                                    | .069                                  |
| 22  | 23-52                             | 85-02    | SE           | V-29         | 0210-0553        | 5                    | 131.19                                     | 4.0            | .030                              | .053                                    | .030                                  |
| 23  | 24-35                             | 85-07    | SE           | V-29         | 0805-1145        | 15                   | 134.43                                     | 4.0            | .030                              | .171                                    | .015                                  |
| 24  | 25-15                             | 85-08    | SE           | V-29         | 1423-1715        | 15                   | 104.88                                     | 4.2            | .040                              | .400                                    | .019                                  |
| 25  | 25-47                             | 85-12    | SE           | V-29         | 1920-2155        | 5                    | 88.33                                      | 24.5           | .291                              | .249                                    | .130                                  |
| 26  | 26-00                             | 84-58    | SE           | V-30         | 0120-0430        | 5                    | 110.75                                     | 11.2           | .101                              | .190                                    | .099                                  |
| 27  | 26-00                             | 84-11    | SE           | V-30         | 0718-1220        | 13                   | 181.28                                     | 5.6            | .031                              | .199                                    | .204                                  |
| 28  | 26-00                             | 83-08    | SE           | V-30         | 1635-1730        | 18                   | 26.67                                      | 11.2           | .420                              | 1.087                                   | 1.012                                 |
| 29  | 26-04                             | 82-38    | SE           | V-30         | 1835-2250        | 8                    | 108.30                                     | 16.0           | .148                              | 1.542                                   | .139                                  |
| 30  | 26-18                             | 82-28    | SE           | V-30/31      | 2300-0135        | 3                    | 119.26                                     | 8.0            | .067                              | .268                                    | 2.440                                 |

TABLE 7 (Continued)

| Tow | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1952 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|-----|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. Lat.                           | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 31  | 26-53                             | 82-36    | SE           | V-31         | 0250-0605        | 3                    | 98.71                                      | 14.4           | .146                              | 1.996                                   | .263                                  |
| 32  | 27-20                             | 83-50    | NE           | VI-1         | 0502-0855        | 12                   | 149.93                                     | 25.6           | .171                              | 1.000                                   | .147                                  |
| 33  | 27-14                             | 84-28    | NE           | VI-1         | 1015-1300        | 15                   | 83.07                                      | 4.0            | .048                              | .313                                    | .036                                  |
| 34  | 27-10                             | 84-56    | NE           | VI-1         | 1315-1535        | 15                   | 87.18                                      | 2.4            | .028                              | .161                                    | .000                                  |
| 35  | 27-06                             | 85-21    | NE           | VI-1         | 1800-2020        | 17                   | 84.15                                      | 4.8            | .057                              | .261                                    | .000                                  |
| 37  | 27-48                             | 85-06    | NE           | VI-2         | 0410-0800        | 5                    | 150.27                                     | 9.6            | .064                              | .213                                    | .293                                  |
| 38  | 28-20                             | 84-40    | NE           | VI-2         | 0925-1210        | 13                   | 93.56                                      | 20.8           | .222                              | .043                                    | .620                                  |
| 39  | 28-54                             | 84-16    | NE           | VI-2         | 1530-2040        | 10                   | 158.50                                     | 17.6           | .111                              | .719                                    | .271                                  |
| 40  | 29-19                             | 84-25    | NE           | VI-2/3       | 2225-0215        | 5                    | 129.02                                     | 25.6           | .198                              | 1.310                                   | 1.139                                 |
| 41  | 29-06                             | 85-06    | NE           | VI-3         | 0310-0635        | 7                    | 117.49                                     | 12.8           | .109                              | .128                                    | 2.017                                 |
| 42  | 28-53                             | 85-46    | NE           | VI-3         | 0816-1153        | 20                   | 143.98                                     | 14.4           | .100                              | .111                                    | .014                                  |
| 43  | 28-40                             | 86-26    | NC           | VI-3         | 1320-1605        | 20                   | 95.58                                      | 4.0            | .042                              | .084                                    | .000                                  |
| 44  | 28-49                             | 87-12    | NC           | VI-3         | 1850-2200        | 12                   | 115.98                                     | 6.4            | .055                              | .207                                    | .017                                  |
| 45  | 28-47                             | 87-51    | NC           | VI-4         | 0105-0500        | 12                   | 123.44                                     | 19.2           | .156                              | .251                                    | .000                                  |
| 46  | 28-40                             | 88-31    | NC           | VI-4         | 0730-1145        | 12                   | 156.63                                     | 2.4            | .015                              | .115                                    | .000                                  |

TABLE 7 (Continued)

| Tow | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1952 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|-----|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. Lat.                           | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 47  | 28-37                             | 89-26    | NC           | VI-4         | 1330-1835        | 12                   | 183.80                                     | 6.4            | .035                              | .147                                    | .016                                  |
| 48  | 28-40                             | 90-00    | NC           | VI-4         | 1845-2030        | 5                    | 57.02                                      | 1.6            | .028                              | 1.333                                   | .053                                  |
| 49  | 28-42                             | 90-43    | NC           | VI-4/5       | 2112-0030        | 5                    | 101.27                                     | 3.6            | .035                              | .444                                    | .148                                  |
| 50  | 28-45                             | 91-07    | NC           | VI-5         | 0045-0615        | 5                    | 183.52                                     | 4.5            | .025                              | .501                                    | 5.591                                 |
| 51  | 28-50                             | 92-04    | NC           | VI-5         | 0700-1155        | 6                    | 151.37                                     | 51.2           | .338                              | 1.090                                   | .370                                  |
| 52  | 28-54                             | 92-48    | NW           | VI-5         | 1210-1730        | 6                    | 150.47                                     | 11.2           | .074                              | .146                                    | 1.402                                 |
| 53  | 28-59                             | 93-36    | NW           | VI-5         | 1738-2105        | 6                    | 97.13                                      | 8.0            | .082                              | .154                                    | 1.843                                 |

Table 8.--Station data, total volumes of plankton and volume of fish larvae and eggs, Cruise 5-2C.  
(G-III sampler; speed of tows: 4-5 knots)

| Sta-<br>tion | Position |          | Sub-<br>Area | Date<br>1952 | Time<br>(start)<br>(G.S.T.) | 30-minute tows |                                   | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton                                |                                       |       |
|--------------|----------|----------|--------------|--------------|-----------------------------|----------------|-----------------------------------|----------------------|--------------------------------------------|-----------------------------------------|---------------------------------------|-------|
|              | N. Lat.  | W. Long. |              |              |                             | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water |                      |                                            | Fish Larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |       |
|              |          |          |              |              |                             |                |                                   |                      |                                            |                                         |                                       |       |
| 1            | 28-24    | 89-42    | NC           | V-21         | 2205                        |                | 200→0                             | 289.18               | 46.1                                       | .159                                    | 1.311                                 | .785  |
| 1A           | 28-20    | 89-06    | NC           | V-22         | 0545                        |                | 200→0                             | 349.76               | 34.1                                       | .097                                    | .326                                  | .066  |
| 2            | 30-08    | 87-30    | NC           | V-24         | 0144                        |                | 5                                 | 181.94               | 46.0                                       | .253                                    | 1.215                                 | 7.002 |
| 3            | 29-38    | 87-29    | NC           | V-24         | 0600                        |                | 15                                | 196.25               | 96.7                                       | .493                                    | 1.900                                 | .825  |
| 4            | 29-10    | 87-29    | NC           | V-24         | 1136                        |                | 200→0                             | 277.66               | 34.1                                       | .123                                    | .447                                  | .025  |
| 5            | 28-37    | 87-29    | NC           | V-24         | 1720                        |                | 200→0                             | 219.03               | 24.0                                       | .110                                    | .110                                  | .000  |
| 6            | 28-04    | 87-32    | NC           | V-25         | 0135                        |                | 100→0                             | 209.85               | 31.4                                       | .150                                    | .129                                  | .009  |
| 8            | 26-40    | 87-32    | C            | V-25         | 1720                        |                | 200→0                             | 286.22               | 25.6                                       | .089                                    | .280                                  | .028  |
| 9            | 26-00    | 87-32    | C            | V-26         | 0130                        |                | 100→0                             | 280.79               | 32.0                                       | .114                                    | .556                                  | .007  |
| 10           | 25-19    | 87-46    | C            | V-26         | 0820                        |                | 200→0                             | 245.57               | 25.4                                       | .103                                    | .269                                  | .033  |
| 11           | 24-53    | 87-00    | C            | V-26         | 1645                        |                | 200→0                             | 221.19               | 20.8                                       | .094                                    | .511                                  | .059  |
| 12           | 24-28    | 86-28    | C            | V-27         | 0005                        |                | 100→0                             | 204.42               | 31.4                                       | .154                                    | .333                                  | .025  |
| 13           | 23-57    | 85-57    | SE           | V-27         | 0755                        |                | 200→0                             | 213.07               | 16.0                                       | .075                                    | .146                                  | .009  |
| 14           | 23-28    | 85-26    | SE           | V-27         | 1545                        |                | 200→0                             | 201.90               | 7.2                                        | .036                                    | .218                                  | .025  |
| 15           | 23-00    | 84-57    | SE           | V-27         | 2240                        |                | 100→0                             | 218.98               | 12.8                                       | .058                                    | .173                                  | .014  |

TABLE 8 (Continued)

| Sta-<br>tion | Position<br>N. Lat. W. Long. | Sub-<br>Area | Date<br>1952 | 30-minute tows              |      | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Volume<br>(ml) | Plankton                          |                                         |                                       |
|--------------|------------------------------|--------------|--------------|-----------------------------|------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|              |                              |              |              | Time<br>(start)<br>(C.S.T.) |      |                      |                                            |                | Volume<br>ml/m <sup>3</sup> water | Fish larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 16           | 22-33                        | 84-28        | SE           | V-28                        | 0600 | 200→0                | 243.27                                     | 8.3            | .034                              | .243                                    | .288                                  |
| 17           | 22-32                        | 84-57        | SE           | V-28                        | 1525 | 200→0                | 269.32                                     | 16.1           | .060                              | .260                                    | .007                                  |
| 18           | 23-00                        | 84-57        | SE           | V-28                        | 2000 | 100→0                | 275.06                                     | 15.5           | .056                              | .222                                    | .014                                  |
| 19           | 23-30                        | 85-00        | SE           | V-29                        | 0135 | 100→0                | 290.95                                     | 14.4           | .049                              | .193                                    | .010                                  |
| 21           | 24-56                        | 85-09        | SE           | V-29                        | 1345 | 200→0                | 290.95                                     | 45.3           | .156                              | .203                                    | .007                                  |
| 22           | 25-34                        | 85-07        | SE           | V-29                        | 1845 | 100→0                | 216.34                                     | 36.5           | .169                              | .596                                    | .014                                  |
| 23           | 26-00                        | 85-15        | SE           | V-30                        | 0045 | 100→0                | 351.43                                     | 36.4           | .104                              | .231                                    | .151                                  |
| 24           | 26-00                        | 84-44        | SE           | V-30                        | 0645 | 250→0                | 353.20                                     | 49.9           | .141                              | .252                                    | .006                                  |
| 25           | 26-00                        | 83-43        | SE           | V-30                        | 1330 | 75→0                 | 380.13                                     | 32.0           | .084                              | .295                                    | .200                                  |
| 26           | 26-00                        | 83-00        | SE           | V-30                        | 1800 | 30                   | 167.77                                     | 46.0           | .274                              | .530                                    | .524                                  |
| 27           | 26-07                        | 82-20        | SE           | V-30                        | 2225 | 10                   | 154.33                                     | 22.4           | .145                              | .569                                    | .265                                  |
| 28           | 26-34                        | 82-36        | SE           | V-31                        | 0215 | 10                   | 181.46                                     | 34.5           | .190                              | 1.350                                   | 5.632                                 |
| 29           | 27-12                        | 82-43        | NE           | V-31                        | 0645 | 5                    | 150.11                                     | 63.2           | .421                              | .966                                    | 1.093                                 |
| 30           | 27-24                        | 83-26        | NE           | VI-1                        | 0425 | 25                   | 265.78                                     | 31.4           | .118                              | .384                                    | .192                                  |
| 31           | 27-17                        | 84-11        | NE           | VI-1                        | 0940 | 10                   | 295.81                                     | 45.3           | .153                              | .240                                    | .105                                  |
| 32           | 27-08                        | 85-07        | NE           | VI-1                        | 1720 | 200→0                | 379.69                                     | 31.4           | .083                              | .208                                    | .008                                  |

TABLE 8 (Continued)

| Sta-<br>tion No. | Position<br>Lat. W. Long. | Sub-<br>Area | Date<br>1952 | Time<br>(start)<br>(G.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|------------------|---------------------------|--------------|--------------|-----------------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|                  |                           |              |              |                             |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish Larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 33               | 27-05 85-40               | NE           | VI-1         | 2317                        | 50→0                 | 311.26                                     | 40.4           | .130                              | .467                                    | .029                                  |
| 34               | 27-28 85-23               | NE           | VI-2         | 0330                        | 50→0                 | 362.03                                     | 46.0           | .127                              | .356                                    | .008                                  |
| 35               | 28-07 84-50               | NE           | VI-2         | 0850                        | 75→0                 | 211.92                                     | 17.6           | .083                              | .245                                    | .193                                  |
| 36               | 28-30 84-32               | NE           | VI-2         | 1450                        | 40→0                 | 255.63                                     | 49.1           | .192                              | 1.909                                   | .509                                  |
| 37               | 29-19 84-02               | NE           | VI-2         | 2150                        | 15                   | 251.66                                     | 46.0           | .183                              | 17.787                                  | .787                                  |
| 38               | 29-19 84-46               | NE           | VI-3         | 0235                        | 20                   | 203.09                                     | 36.3           | .179                              | 2.432                                   | 1.659                                 |
| 39               | 28-54 85-25               | NE           | VI-3         | 0737                        | 100→0                | 325.83                                     | 22.8           | .070                              | .295                                    | .110                                  |
| 40               | 28-33 86-06               | NC           | VI-3         | 1245                        | 100→0                | 184.55                                     | 22.4           | .121                              | .694                                    | .043                                  |
| 41               | 28-48 86-51               | NC           | VI-3         | 1815                        | 100→0                | 373.95                                     | 19.2           | .051                              | .198                                    | .005                                  |
| 42               | 28-50 87-30               | NC           | VI-4         | 0030                        | 100→0                | 328.92                                     | 19.2           | .058                              | .760                                    | .024                                  |
| 43               | 28-44 88-12               | NC           | VI-4         | 0650                        | 200→0                | 333.33                                     | 16.0           | .048                              | .100                                    | .006                                  |
| 44               | 28-35 89-00               | NC           | VI-4         | 1300                        | 200→0                | 313.46                                     | 19.2           | .061                              | .175                                    | .006                                  |



Figure 8.--Location of plankton tows made during Cruise 7 (Special), November 1952. Numbers identify stations.

Table 9.--Station data, total volumes of plankton and volume of fish larvae and eggs, Cruise 7 (Special).  
(G-IA sampler; speed of tows: 9-10 knots)

| Tow | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1952 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|-----|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. Lat.                           | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish Larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
|     |                                   |          |              |              |                  |                      |                                            |                |                                   |                                         |                                       |
| 1   | 28-40                             | 91-35    | NC           | XI-14        | 1017-1417        | 15                   | 118.50                                     | 26             | .219                              | .945                                    | .270                                  |
| 2   | 28-36                             | 90-52    | NC           | XI-14        | 1435-1835        | 15                   | 118.57                                     | 19             | .160                              | .953                                    | .759                                  |
| 3   | 28-22                             | 90-06    | NC           | XI-14        | 1850-2315        | 8-10                 | 131.84                                     | 10             | .076                              | .348                                    | .182                                  |
| 4   | 28-11                             | 89-13    | NC           | XI-15        | 2330-0550        | 7                    | 148.85                                     | 11             | .074                              | .080                                    | .006                                  |
| 5   | 27-58                             | 88-06    | NC           | XI-15        | 0615-1115        | 15                   | 144.60                                     | 11             | .076                              | .034                                    | .006                                  |
| 6   | 27-49                             | 87-18    | NC           | XI-15        | 1122-1622        | 15                   | 146.08                                     | 10             | .068                              | .068                                    | .000                                  |
| 7   | 27-40                             | 86-37    | NC           | XI-15        | 1635-2035        | 10                   | 121.38                                     | 14             | .115                              | .041                                    | .000                                  |
| 8   | 27-28                             | 86-01    | NC           | XI-15/16     | 2048-0048        | 6                    | 122.65                                     | 7              | .057                              | .008                                    | .000                                  |
| 9   | 26-58                             | 84-20    | SE           | XI-16        | 0620-1040        | 15                   | 137.35                                     | 6              | .044                              | .116                                    | .058                                  |
| 10  | 26-42                             | 83-36    | SE           | XI-16        | 1052-1452        | 15                   | 120.30                                     | 6              | .050                              | .091                                    | .091                                  |
| 11  | 26-35                             | 82-52    | SE           | XI-16        | 1505-1905        | 15                   | 118.25                                     | 21             | .178                              | .084                                    | .025                                  |
| 12  | 26-34                             | 82-25    | SE           | XI-16        | 1915-2115        | 8                    | 59.39                                      | 24             | .404                              | .067                                    | .084                                  |
| 13  | 26-25                             | 82-15    | SE           | XI-16/17     | 2125-0217        | 6                    | 75.97                                      | 26             | .342                              | .052                                    | .000                                  |
| 14  | 26-20                             | 82-05    | SE           | XI-17        | 0230-0628        | 6                    | 89.53                                      | 8              | .089                              | .011                                    | .000                                  |
| 15  | off Sanibel Island                |          | SE           | XI-17        | 0636-0940        | 6                    | 95.79                                      | 3              | .031                              | .010                                    | .020                                  |

TABLE 9 (Continued)

| Tow | Position           |          | Sub-<br>Area | Date<br>1952 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|-----|--------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. Lat.            | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish Larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 16  | off Sanibel Island |          | SE           | XI-17        | 1530-1700        | 6                    | 34.17                                      | 5              | .146                              | .000                                    | .000                                  |
| 17  | "                  | "        | SE           | XI-18        | 0930-1125        | 5                    | 42.49                                      | 29             | .683                              | .000                                    | .000                                  |
| 18  | 26-45              | 82-35    | SE           | XI-19        | 0830-1230        | 3-10                 | 124.71                                     | 29             | .233                              | .160                                    | .890                                  |
| 19  | 27-25              | 82-50    | SE           | XI-19        | 1245-1620        | 10                   | 106.07                                     | 20             | .189                              | .056                                    | 1.055                                 |
| 20  | 26-04              | 82-21    | SE           | XI-23        | 0615-0715        | 10                   | 28.57                                      | 4              | .140                              | .105                                    | .105                                  |
| 21  | 26-15              | 82-15    | SE           | XI-23        | 0755-1130        | 10                   | 100.30                                     | 16             | .160                              | .009                                    | .119                                  |
| 22  | 26-20              | 82-05    | SE           | XI-23        | 1220-1320        | 4                    | 30.85                                      | 4              | .130                              | .032                                    | .000                                  |
| 23  | 26-15              | 83-00    | SE           | XI-23        | 1515-2330        | 5                    | 239.92                                     | 32             | .133                              | .062                                    | .004                                  |
| 24  | 26-28              | 83-56    | SE           | XI-23/24     | 2340-0545        | 6-8                  | 194.59                                     | 20             | .103                              | .298                                    | .210                                  |
| 25  | 26-35              | 84-48    | SE           | XI-24        | 0600-1000        | 10                   | 170.69                                     | 8              | .047                              | .076                                    | .017                                  |
| 26  | 26-45              | 85-50    | SE           | XI-24        | 1020-1615        | 10-12                | 193.75                                     | 5              | .026                              | .020                                    | .020                                  |
| 27  | 26-57              | 86-35    | C            | XI-24        | 1630-2030        | 8                    | 126.54                                     | 8              | .063                              | .110                                    | .007                                  |
| 28  | 27-11              | 87-22    | NC           | XI-24/25     | 2040-0240        | 5                    | 184.89                                     | 14             | .076                              | .081                                    | .016                                  |
| 29  | 27-30              | 88-21    | NC           | XI-25        | 0400-0600        | 3                    | 59.75                                      | 11             | .184                              | .083                                    | .000                                  |

\*Half-speed

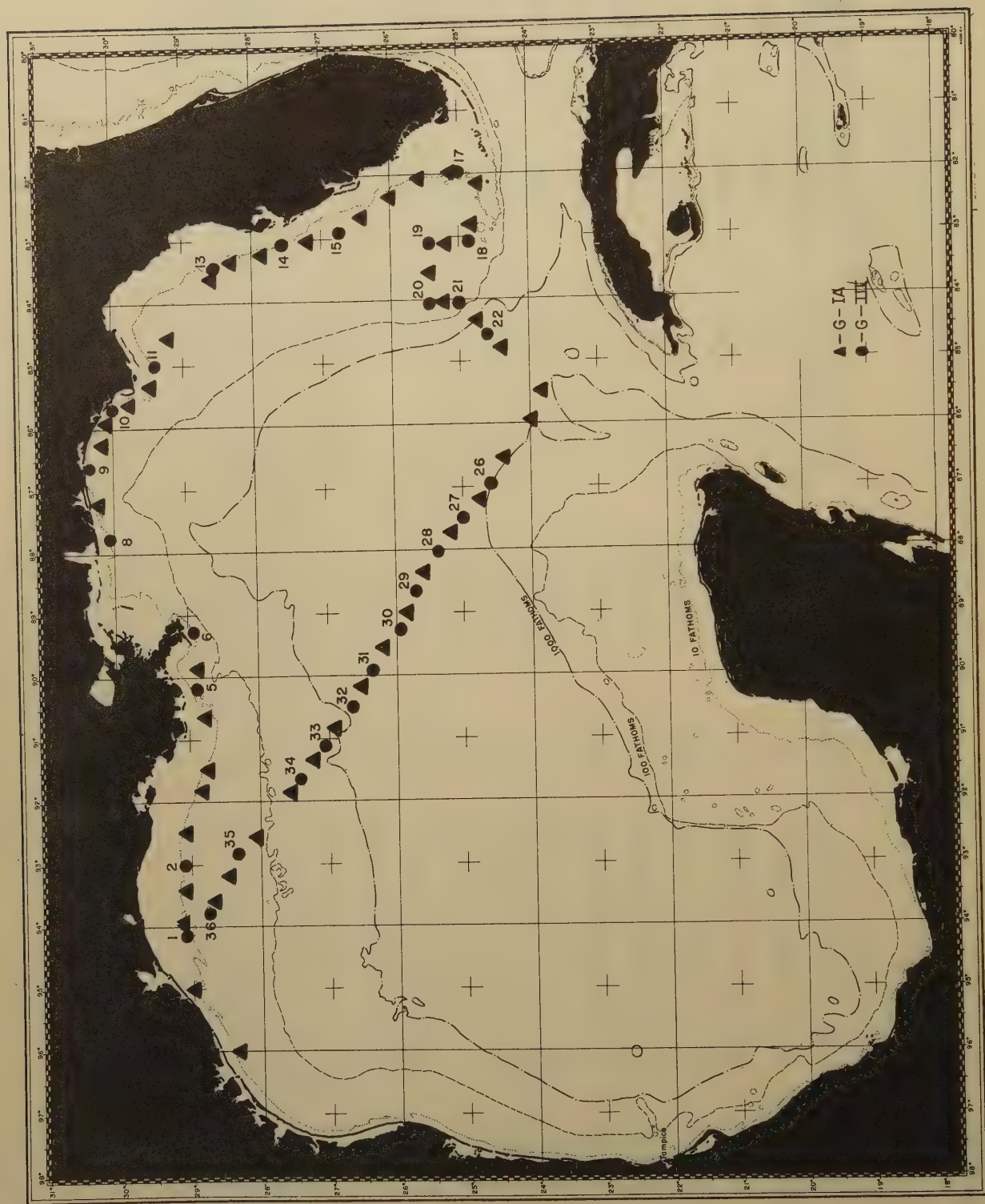


Figure 9.--Location of plankton tows made during Cruise 8, February 1953, and Cruise 9 (Special), March 1953. Numbers identify stations.

Table 10.--Station data, total volumes of plankton and volume of fish larvae and eggs, Cruise 8.  
(G-IA sampler; speed of tows: 9-10 knots)

| Tow | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1953 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|-----|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. lat.                           | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 1   | 29-06                             | 93-55    | NW           | II-12        | 1315-1715        | 7                    | 116.41                                     | 4.8            | .041                              | .163                                    | .722                                  |
| 2   | 29-05                             | 93-25    | NW           | II-12        | 1725-2055        | 6                    | 135.31                                     | 4.0            | .030                              | .103                                    | .177                                  |
| 3   | 29-03                             | 92-30    | NW           | II-12/13     | 2235-0405        | 6                    | 150.47                                     | 4.5            | .030                              | .047                                    | .465                                  |
| 4   | 28-50                             | 91-50    | NC           | II-13        | 0530-0830        | 8                    | 84.98                                      | 4.5            | .053                              | .094                                    | .141                                  |
| 5   | 28-44                             | 91-30    | NC           | II-13        | 0850-1050        | 8                    | 57.87                                      | 3.0            | .052                              | .380                                    | .017                                  |
| 6   | 28-45                             | 90-38    | NC           | II-13        | 1400-2040        | 10                   | 183.95                                     | 10.0           | .054                              | .125                                    | .419                                  |
| 7   | 28-51                             | 89-53    | NC           | II-13/14     | 2212-0245        | 3                    | 129.42                                     | 26.0           | .201                              | 1.035                                   | .703                                  |
| 8   | 30-13                             | 87-13    | NC           | II-14/15     | 2355-0555        | 5                    | 179.37                                     | 18.0           | .100                              | .033                                    | .151                                  |
| 9   | 30-10                             | 86-15    | NC           | II-17        | 0722-1052        | 8                    | 105.60                                     | 11.0           | .104                              | .227                                    | .038                                  |
| 10  | 30-06                             | 85-55    | NE           | II-17        | 1105-1255        | 8                    | 53.12                                      | 3.0            | .056                              | .075                                    | .264                                  |
| 11  | 29-47                             | 85-38    | NE           | II-18        | 0950-1250        | 5-10                 | 86.77                                      | 4.5            | .052                              | .519                                    | .046                                  |
| 12  | 29-27                             | 85-21    | NE           | II-18        | 1300-1700        | 10                   | 110.44                                     | 8.5            | .077                              | .181                                    | 1.693                                 |
| 13  | 29-12                             | 84-32    | NE           | II-18/19     | 1825-0115        | 6-8                  | 145.65                                     | 5.0            | .034                              | .027                                    | 7.271                                 |
| 14  | 28-36                             | 83-36    | NE           | II-19        | 0725-1025        | 10                   | 99.87                                      | 5.0            | .050                              | .280                                    | 1.071                                 |
| 15  | 28-20                             | 83-22    | NE           | II-19        | 1225-1525        | 10                   | 93.69                                      | 0.3            | .003                              | .032                                    | .320                                  |

TABLE 10 (Continued)

| Tow | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1953 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|-----|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. Lat.                           | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
|     |                                   |          |              |              |                  |                      |                                            |                |                                   |                                         |                                       |
| 16  | 27-53                             | 83-15    | NE           | II-19        | 1531-1931        | 10                   | 101.29                                     | 0.5            | .005                              | .079                                    | 2.468                                 |
| 17  | 27-13                             | 83-02    | NE           | II-19/20     | 2130-0330        | 5                    | 175.33                                     | 8.0            | .046                              | .211                                    | .359                                  |
| 18  | 26-26                             | 82-40    | SE           | II-20        | 0515-0930        | 6                    | 102.53                                     | 10.0           | .098                              | .205                                    | .790                                  |
| 19  | 26-00                             | 82-20    | SE           | II-20        | 0940-1220        | 8                    | 71.72                                      | 4.0            | .056                              | .098                                    | 1.004                                 |
| 20  | 25-35                             | 82-04    | SE           | II-20        | 1305-1705        | 10                   | 118.61                                     | 9.5            | .080                              | .084                                    | .430                                  |
| 21  | 25-06                             | 82-00    | SE           | II-20        | 1720-1950        | 5                    | 70.35                                      | 9.0            | .128                              | .128                                    | 4.733                                 |
| 22  | 24-43                             | 82-10    | SE           | II-22        | 1030-1515        | 5                    | 144.16                                     | 9.0            | .062                              | .076                                    | .923                                  |
| 23  | 24-50                             | 82-48    | SE           | II-22        | 1525-1815        | 10                   | 85.56                                      | 6.0            | .070                              | .281                                    | 2.606                                 |
| 24  | 25-12                             | 83-08    | SE           | II-22/23     | 1955-0025        | 5                    | 134.89                                     | 13.0           | .096                              | .082                                    | 2.098                                 |
| 25  | 25-27                             | 83-35    | SE           | II-23        | 0145-0615        | 5                    | 133.42                                     | 12.5           | .094                              | .112                                    | .757                                  |
| 26  | 25-14                             | 84-02    | SE           | II-23        | 0850-1150        | 12                   | 97.60                                      | 3.0            | .031                              | .010                                    | .061                                  |
| 27  | 24-46                             | 84-18    | SE           | II-23        | 1345-1655        | 10                   | 87.15                                      | 1.0            | .011                              | .023                                    | .000                                  |
| 28  | 24-23                             | 84-47    | SE           | II-23/24     | 2300-0310        | 4                    | 140.56                                     | 2.0            | .014                              | .014                                    | .007                                  |
| 29  | 23-50                             | 85-28    | SE           | II-24        | 0635-1145        | 12                   | 144.61                                     | 3.0            | .021                              | .048                                    | .028                                  |
| 30  | 23-57                             | 85-59    | SE           | II-24        | 1340-1750        | 12                   | 123.89                                     | 3.0            | .024                              | .032                                    | .000                                  |

TABLE 10 (Continued)

| Tow | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1953 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|-----|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. Lat.                           | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 31  | 24-25                             | 86-34    | C            | II-24/25     | 2125-0035        | 12                   | 85.38                                      | 3.0            | .035                              | .047                                    | .012                                  |
| 32  | 24-45                             | 87-14    | C            | II-25        | 0350-0810        | 5                    | 130.47                                     | 3.0            | .023                              | .069                                    | .046                                  |
| 33  | 25-10                             | 87-44    | C            | II-25        | 1145-1350        | 12                   | 61.09                                      | 1.0            | .017                              | .098                                    | .016                                  |
| 34  | 25-34                             | 88-22    | C            | II-25        | 1640-1940        | 12                   | 83.53                                      | 6.0            | .072                              | .539                                    | .012                                  |
| 35  | 25-50                             | 89-00    | C            | II-25/26     | 2205-0120        | 5                    | 97.24                                      | 7.0            | .072                              | .031                                    | .041                                  |
| 36  | 26-11                             | 89-35    | C            | II-26        | 0320-0800        | 5                    | 123.51                                     | 7.0            | .057                              | .138                                    | .000                                  |
| 37  | 26-31                             | 90-11    | C            | II-26        | 1035-1345        | 10                   | 84.95                                      | 2.0            | .024                              | .024                                    | .012                                  |
| 39  | 27-15                             | 91-20    | NC           | II-26/27     | 2245-0400        | 3                    | 143.55                                     | 24.0           | .167                              | .007                                    | .017                                  |
| 40  | 27-35                             | 91-50    | NC           | II-27        | 0631-1001        | 10                   | 98.75                                      | 12.5           | .127                              | .041                                    | .020                                  |
| 41  | 28-04                             | 92-26    | NW           | II-27        | 1010-1400        | 10                   | 115.33                                     | 9.0            | .078                              | .139                                    | .139                                  |
| 42  | 28-29                             | 93-10    | NW           | II-27        | 1516-1834        | 10                   | 135.69                                     | 12.0           | .088                              | .560                                    | .766                                  |
| 43  | 28-40                             | 93-37    | NW           | II-27        | 1838-2038        | 5                    | 59.11                                      | 4.0            | .068                              | .186                                    | 2.555                                 |
| 44  | 29-07                             | 93-56    | NW           | II-27/28     | 2255-0120        | 3                    | 107.33                                     | 2.0            | .019                              | .075                                    | .391                                  |

Table 11.---Station data, total volumes of plankton and volume of fish larvae and eggs, Cruise 8.  
(G-III sampler; speed of tows: 4-5 knots)

| Sta-<br>tion | Position<br>N. Lat. W. Long. | Sub-<br>Area | Date<br>1953 | Time<br>(start)<br>(G.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|--------------|------------------------------|--------------|--------------|-----------------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|              |                              |              |              |                             |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| *1           | 29-05                        | 94-10        | II-28        | 0200                        | 3                    | 336.42                                     | 30.0           | .089                              | .699                                    | .012                                  |
| 13           | 28-33                        | 83-26        | II-19        | 1150                        | 10                   | 245.33                                     | 95.0           | .387                              | .183                                    | .289                                  |
| 14           | 27-35                        | 83-05        | II-19        | 2040                        | 3                    | 309.69                                     | 49.0           | .158                              | .297                                    | 1.724                                 |
| 15           | 26-45                        | 82-55        | II-20        | 0430                        | 5                    | 353.89                                     | 60.0           | .170                              | .240                                    | .430                                  |
| 17           | 25-00                        | 81-58        | II-20        | 2100                        | 5                    | 201.00                                     | 41.0           | .204                              | .294                                    | 1.065                                 |
| 18           | 24-52                        | 83-03        | II-22        | 1915                        | 5                    | 294.19                                     | 41.5           | .141                              | .122                                    | .619                                  |
| 19           | 25-27                        | 83-05        | II-23        | 0110                        | 3                    | 386.67                                     | 62.0           | .160                              | .316                                    | .978                                  |
| 20           | 25-27                        | 84-02        | II-23        | 0815                        | 10-12                | 289.63                                     | 23.0           | .079                              | .193                                    | .021                                  |
| 21           | 25-00                        | 84-02        | II-23        | 1245                        | 10                   | 369.92                                     | 26.5           | .072                              | .027                                    | .011                                  |
| 22           | 24-36                        | 84-32        | II-23        | 2210                        | 6                    | 265.50                                     | 26.5           | .100                              | .045                                    | .030                                  |
| 26           | 24-35                        | 86-52        | II-25        | 0315                        | 5                    | 286.53                                     | 32.0           | .112                              | .171                                    | .063                                  |
| 27           | 25-00                        | 87-31        | II-25        | 1010                        | 10                   | 281.18                                     | 10.0           | .036                              | .235                                    | .011                                  |
| 28           | 25-21                        | 88-01        | II-25        | 1605                        | 10                   | 407.16                                     | 20.0           | .049                              | .260                                    | .017                                  |
| 29           | 25-43                        | 88-40        | II-25        | 2130                        | 3                    | 405.77                                     | 81.5           | .201                              | .113                                    | .190                                  |

TABLE 11 (Continued)

| Sta-<br>tion | Position |          | Sub-<br>Area | Date<br>1953 | Time<br>(start)<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|--------------|----------|----------|--------------|--------------|-----------------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|              | N. Lat.  | W. Long. |              |              |                             |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish Larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 30           | 25-56    | 89-17    | C            | II-26        | 0315                        | 3                    | 305.00                                     | 60.0           | .197                              | .623                                    | .010                                  |
| 31           | 26-21    | 89-54    | C            | II-26        | 1000                        | 8-10                 | 261.23                                     | 20.0           | .077                              | .161                                    | .004                                  |
| 32           | 26-40    | 90-30    | C            | II-26        | 1555                        | 10                   | 258.02                                     | 60.0           | .233                              | .012                                    | .004                                  |
| 33           | 27-05    | 91-06    | NC           | II-26        | 2210                        | 3                    | 226.30                                     | 35.0           | .155                              | .009                                    | .000                                  |
| 34           | 27-26    | 91-40    | NC           | II-27        | 0600                        | 10                   | 264.43                                     | 113.5          | .429                              | .284                                    | .015                                  |
| 35           | 28-21    | 92-50    | NW           | II-27        | 1445                        | 10                   | 349.25                                     | 45.0           | .129                              | .598                                    | 3.926                                 |
| 36           | 28-45    | 93-48    | NW           | II-27        | 2120                        | 3                    | 394.16                                     | 19.0           | .048                              | .066                                    | 2.763                                 |

\*Station 1 occupied last due to adverse weather.

| Qualitative tows |       |       |    |       |      |    | Volume<br>(ml) | No. of Larvae No. of Eggs |     |
|------------------|-------|-------|----|-------|------|----|----------------|---------------------------|-----|
|                  |       |       |    |       |      |    |                |                           |     |
| 2                | 29-06 | 93-00 | NW | II-12 | 2155 | 6  | 19.0           | 16                        | 530 |
| 5                | 28-54 | 90-11 | NC | II-13 | 2140 | 3  | 33.0           | 39                        | 18  |
| 6                | 28-55 | 89-18 | NC | II-14 | 0705 | 10 | 44.5           | 25                        | 21  |
| 8                | 30-95 | 87-47 | NC | II-16 | 2315 | 3  | 22.0           | 1                         | 25  |
| 9                | 30-20 | 86-38 | NC | II-17 | 0650 | 6  | 117.0          | 46                        | 27  |
| 10               | 30-00 | 85-40 | NE | II-17 | 1330 | 6  | 36.0           | 31                        | 36  |
| 11               | 29-25 | 85-00 | NE | II-18 | 1745 | 5  | 24.0           | 34                        | 412 |



Figure 10.--Location of plankton tows made during Cruise 10-2B, April 1953.  
Numbers identify stations.

Table 12.--Station data, total volumes of plankton and volume of fish larvae and eggs, Cruises 9 and 10-2B.  
(G-1A sampler; speed of tows: 9-10 knots)

| Tow          | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1953 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|--------------|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|              | N. Lat.                           | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish Larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
|              |                                   |          |              |              |                  |                      |                                            |                |                                   |                                         |                                       |
| 1            | 29-00                             | 95-00    | NW           | III-9        | 1740-2110        | 8                    | 110.10                                     | 6.0            | .054                              | .282                                    | .345                                  |
| 2            | 28-20                             | 96-00    | NW           | III-10       | 0540-0710        | 8                    | 59.36                                      | 6.0            | .101                              | .118                                    | .084                                  |
| Cruise 9     |                                   |          |              |              |                  |                      |                                            |                |                                   |                                         |                                       |
| 2            | 26-28                             | 97-06    | WC           | IV-15        | 1735-2055        | 8                    | 103.47                                     | 7.0            | .073                              | .213                                    | 7.123                                 |
| 3            | 25-50                             | 97-02    | WC           | IV-15/16     | 2205-0220        | 3                    | 150.58                                     | 12.0           | .080                              | .418                                    | 2.006                                 |
| 4            | 25-16                             | 97-14    | WC           | IV-16        | 0335-0635        | 3                    | 98.79                                      | 12.5           | .127                              | 1.994                                   | .364                                  |
| 5            | 24-34                             | 97-25    | WC           | IV-16        | 0800-1100        | 8                    | 99.80                                      | 2.5            | .025                              | .741                                    | .381                                  |
| 6            | 23-58                             | 97-32    | SW           | IV-16        | 1220-1515        | 8                    | 99.72                                      | 3.5            | .035                              | .632                                    | .391                                  |
| 7            | 23-20                             | 97-37    | SW           | IV-16        | 1635-1955        | 8                    | 113.63                                     | 4.0            | .035                              | .651                                    | .766                                  |
| 8            | 22-38                             | 97-31    | SW           | IV-16/17     | 2120-0050        | 5                    | 113.08                                     | 3.5            | .031                              | .265                                    | .460                                  |
| 9            | 21-55                             | 97-11    | SW           | IV-17        | 0140-0810        | 5                    | 181.54                                     | 3.0            | .017                              | .424                                    | .380                                  |
| 10           | 21-17                             | 97-13    | SW           | IV-17        | 0920-1220        | 10                   | 97.63                                      | 4.0            | .041                              | .410                                    | .543                                  |
| 11           | 20-48                             | 96-57    | SW           | IV-17        | 1335-1800        | 10                   | 122.68                                     | 6.0            | .049                              | .758                                    | .310                                  |
| 12           | 20-17                             | 96-35    | SW           | IV-17        | 1925-2210        | 5                    | 93.57                                      | 2.5            | .027                              | .235                                    | .524                                  |
| Cruise 10-2B |                                   |          |              |              |                  |                      |                                            |                |                                   |                                         |                                       |

TABLE 12 (Continued)

| Tow | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1953 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|-----|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. Lat.                           | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
|     |                                   |          |              |              |                  |                      |                                            |                |                                   |                                         |                                       |
| 13  | 21-10                             | 96-00    | SW           | IV-18        | 0830-1245        | 10                   | 129.89                                     | 2.5            | .019                              | .077                                    | .000                                  |
| 14  | 22-00                             | 96-00    | SW           | IV-18        | 1525-1825        | 10                   | 104.16                                     | .9             | .009                              | .029                                    | .058                                  |
| 15  | 22-41                             | 96-00    | SW           | IV-18/19     | 2135-0105        | 8                    | 118.19                                     | 2.5            | .021                              | .059                                    | .042                                  |
| 16  | 23-10                             | 96-00    | SW           | IV-19        | 0345-0618        | 5                    | 81.96                                      | 3.5            | .043                              | .098                                    | .110                                  |
| 17  | 26-13                             | 96-00    | WC           | IV-20        | 1435-1820        | 10                   | 105.99                                     | 3.0            | .028                              | .113                                    | .038                                  |
| 18  | 26-46                             | 95-55    | WC           | IV-20        | 2100-0000        | 5                    | 99.47                                      | 3.0            | .030                              | .030                                    | .020                                  |
| 19  | 27-34                             | 95-44    | WC           | IV-21        | 0225-0605        | 5                    | 121.33                                     | 5.5            | .045                              | .025                                    | .058                                  |
| 20  | 28-02                             | 95-20    | NW           | IV-21        | 0805-1125        | 10                   | 106.25                                     | 4.0            | .038                              | .527                                    | .602                                  |
| 21  | 28-28                             | 94-50    | NW           | IV-21        | 1248-1702        | 10                   | 144.42                                     | 8.5            | .059                              | 1.115                                   | 3.005                                 |
| 22  | 29-07                             | 93-15    | NW           | IV-30/V-1    | 2200-0600        | 5                    | 242.62                                     | 21.6           | .089                              | 1.884                                   | 2.180                                 |
| 23  | 29-05                             | 92-15    | NW           | V-1          | 0610-0920        | 10                   | 109.74                                     | 12.5           | .114                              | .301                                    | 6.288                                 |
| 24  | 28-40                             | 92-00    | NW           | V-1          | 1055-1435        | 10                   | 108.12                                     | 7.5            | .069                              | .435                                    | .953                                  |
| 25  | 28-05                             | 92-00    | WC           | V-1          | 1445-2025        | 10                   | 157.64                                     | 3.0            | .019                              | .114                                    | .159                                  |
| 26  | 27-24                             | 91-59    | NC           | V-1/2        | 2215-0345        | 10                   | 142.17                                     | 8.0            | .056                              | .007                                    | .091                                  |

TABLE 12 (Continued)

| Tow | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1953 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Volume<br>(ml) | Plankton                          |                                         |                                       |
|-----|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. Lat.                           | W. Long. |              |              |                  |                      |                                            |                | Volume<br>ml/m <sup>3</sup> water | Fish larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 27  | 26-46                             | 91-58    | NC           | V-2          | 0605-1005        | 10                   | 105.06                                     | 1.5            | .014                              | .086                                    | .124                                  |
| 28  | 26-15                             | 92-00    | C            | V-2          | 1330-1720        | 10                   | 113.24                                     | 1.5            | .013                              | .044                                    | .097                                  |
| 29  | 26-18                             | 92-23    | WC           | V-3          | 0810-1155        | 10                   | 124.16                                     | 1.0            | .008                              | .032                                    | .040                                  |
| 30  | 26-55                             | 92-52    | WC           | V-3          | 1250-1800        | 10                   | 168.60                                     | 2.5            | .015                              | .030                                    | .042                                  |

Table 13.--Station data, total volumes of plankton and volume of fish larvae and eggs, Cruise 10-2B.  
(G-III sampler; speed of tows: 4-5 knots)

| Station | Position |          | Sub-Area | Date<br>1953 | Time<br>(start)<br>(G.S.T.) | Depth of<br>tow (m.) | Plankton             |                          | No. of<br>Fish<br>Eggs |
|---------|----------|----------|----------|--------------|-----------------------------|----------------------|----------------------|--------------------------|------------------------|
|         | N. Lat.  | W. Long. |          |              |                             |                      | Volume<br>in<br>(ml) | No. of<br>Fish<br>Larvae |                        |
| 3       | 26-48    | 97-07    | WC       | IV-15        | 1700                        | 8                    | 111.0                | 137                      | 677                    |
| 4       | 26-08    | 96-58    | WC       | IV-15        | 2130                        | 3                    | 12.5                 | 368                      | 349                    |
| 5       | 25-30    | 97-06    | WC       | IV-16        | 0300                        | 3                    | 50.5                 | 509                      | 2668                   |
| 6       | 24-55    | 97-08    | WC       | IV-16        | 0730                        | 8                    | 35.0                 | 498                      | 384                    |
| 7       | 24-13    | 97-21    | WC       | IV-16        | 1145                        | 8                    | 15.5                 | 422                      | 249                    |
| 8       | 23-40    | 97-30    | SW       | IV-16        | 1600                        | 8                    | 17.0                 | 469                      | 323                    |
| 11      | 21-28    | 97-10    | SW       | IV-17        | 0845                        | 10                   | 15.0                 | 228                      | 337                    |
| 12      | 20-58    | 97-03    | SW       | IV-17        | 1300                        | 10                   | 28.0                 | 149                      | 435                    |
| 13      | 20-37    | 96-41    | SW       | IV-17        | 1850                        | 8                    | 20.0                 | 1669                     | 137                    |
| 16      | 21-42    | 96-00    | SW       | IV-18        | 1450                        | 10                   | 11.0                 | 128                      | 33                     |
| 17      | 22-23    | 96-00    | SW       | IV-18        | 2105                        | 10                   | 23.0                 | 52                       | 11                     |
| 18      | 23-00    | 96-00    | SW       | IV-19        | 0313                        | 3                    | 23.5                 | 16                       | 37                     |
| 24      | 26-31    | 96-00    | WC       | IV-20        | 2030                        | 3                    | 20.0                 | 31                       | 26                     |
| 25      | 27-08    | 95-58    | NW       | IV-21        | 0150                        | 3                    | 12.5                 | 8                        | 53                     |

TABLE 13 (Continued)

| Station     | Position |          | Sub-Area | Date<br>1953 | Time<br>(start)<br>(C.S.T.) | Depth of<br>tow (m.) | Plankton             |                          |                        |
|-------------|----------|----------|----------|--------------|-----------------------------|----------------------|----------------------|--------------------------|------------------------|
|             | N. Lat.  | W. Long. |          |              |                             |                      | Volume<br>in<br>(ml) | No. of<br>Fish<br>Larvae | No. of<br>Fish<br>Eggs |
| 26          | 27-55    | 95-30    | NW       | IV-21        | 0800                        | 10                   | 13.0                 | 154                      | 402                    |
| 27          | 28-10    | 95-00    | NW       | IV-21        | 1215                        | 10                   | 19.0                 | 526                      | 1087                   |
| 27A         | 28-14    | 94-44    | NW       | IV-21        | 1710                        | 10                   | 36.5                 | 774                      | 1217                   |
| 28          | 29-12    | 94-00    | NW       | IV-30        | 2127                        | 3                    | 177.0                | 381                      | 428                    |
| 29          | 29-01    | 92-00    | NW       | IV-31        | 1005                        | 10                   | 110.0                | 8                        | 415                    |
| 30          | 28-20    | 92-00    | NW       | IV-31        | 1520                        | 10                   | 20.0                 | 89                       | 138                    |
| Special tow | 26-32    | 92-29    | WC       | V-3          | 1200                        | 10                   | 20.0                 | 35                       | 29                     |



Figure 11.--Location of plankton tows made during Cruise 11, May-June 1953.  
Numbers identify stations.

Table 14.--Station data, total volumes of plankton and volume of fish larvae and eggs, Cruise 11.  
(G-1A sampler; speed of tows: 9-10 knots)

| Tow | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1953 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|-----|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. Lat.                           | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish Larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
|     |                                   |          |              |              |                  |                      |                                            |                |                                   |                                         |                                       |
| 1   | 29-19                             | 94-19    | NW           | V-27         | 1510-2010        | 15                   | 124.42                                     | 30.0           | .241                              | .121                                    | 5.176                                 |
| 2   | 29-14                             | 93-53    | NW           | V-28/29      | 2225-0420        | 5                    | 169.03                                     | 55.0           | .325                              | .544                                    | .935                                  |
| 3   | 29-10                             | 93-01    | NW           | V-29         | 0500-1050        | 15                   | 180.74                                     | 27.0           | .149                              | .155                                    | 5.234                                 |
| 4   | 28-56                             | 92-00    | NC           | V-29         | 1135-1735        | 15                   | 184.07                                     | 21.0           | .114                              | .054                                    | .255                                  |
| 5   | 28-36                             | 91-04    | NC           | V-29         | 1815-2355        | 15                   | 228.92                                     | 10.0           | .044                              | .039                                    | .297                                  |
| 6   | 28-37                             | 90-17    | NC           | V-30         | 0030-0605        | 15                   | 187.41                                     | 23.0           | .123                              | .320                                    | .651                                  |
| 7   | 28-50                             | 89-14    | NC           | V-30         | 0645-1300        | 15                   | 164.27                                     | 18.0           | .110                              | .262                                    | 55.719                                |
| 8   | 29-35                             | 88-32    | NC           | V-30         | 1346-1944        | 15                   | 158.29                                     | 82.5           | .521                              | .505                                    | 1.826                                 |
| 9   | 30-04                             | 87-40    | NC           | V-30/31      | 2018-0213        | 5                    | 165.69                                     | 20.0           | .121                              | .109                                    | 1.183                                 |
| 10  | 30-07                             | 86-38    | NC           | V-31         | 0245-0850        | 5                    | 196.22                                     | 25.0           | .127                              | .194                                    | .683                                  |
| 11  | 29-41                             | 85-39    | NE           | V-31         | 0928-1528        | 15                   | 162.43                                     | 28.0           | .172                              | .215                                    | .788                                  |
| 12  | 29-27                             | 84-34    | NE           | V-31         | 1710-2319        | 10                   | 194.06                                     | 28.0           | .144                              | .361                                    | 2.303                                 |
| 13  | 28-49                             | 84-12    | NE           | V-31/VI-1    | 2352-0550        | 5                    | 181.38                                     | 20.0           | .110                              | .402                                    | 4.571                                 |
| 14  | 27-58                             | 83-16    | NE           | VI-1         | 0628-1220        | 15                   | 168.04                                     | 28.0           | .167                              | .179                                    | 1.160                                 |

TABLE 14 (Continued)

| Tow | Position<br>(mid-point<br>of tow) |          | Sub-<br>Area | Date<br>1953 | Time<br>(C.S.T.) | Depth of<br>tow (m.) | Volume water<br>strained in m <sup>3</sup> | Plankton       |                                   |                                         |                                       |
|-----|-----------------------------------|----------|--------------|--------------|------------------|----------------------|--------------------------------------------|----------------|-----------------------------------|-----------------------------------------|---------------------------------------|
|     | N. Lat.                           | W. Long. |              |              |                  |                      |                                            | Volume<br>(ml) | Volume<br>ml/m <sup>3</sup> water | Fish Larvae<br>no./m <sup>3</sup> water | Fish Eggs<br>no./m <sup>3</sup> water |
| 15  | 27-12                             | 82-44    | NE           | VI-4         | 1046-1646        | 5                    | 162.18                                     | 25.0           | .154                              | .080                                    | 1.085                                 |
| 16  | 26-30                             | 82-15    | SE           | VI-4         | 1707-2308        | 5                    | 157.86                                     | 22.0           | .139                              | .824                                    | 1.761                                 |
| 17  | 25-50                             | 81-58    | SE           | VI-4/5       | 2319-0519        | 5                    | 146.05                                     | 21.0           | .144                              | 3.923                                   | 6.429                                 |
| 18  | 25-08                             | 81-54    | SE           | VI-5         | 0541-1053        | 5                    | 146.25                                     | 26.0           | .178                              | 1.415                                   | 3.323                                 |
| 19  | 24-42                             | 82-30    | SE           | VI-7         | 0750-1350        | 5                    | 186.87                                     | 5.0            | .027                              | .043                                    | 3.462                                 |
| 20  | 24-52                             | 83-33    | SE           | VI-7         | 1745-2340        | 5                    | 150.94                                     | 7.0            | .046                              | .126                                    | .815                                  |
| 22  | 25-31                             | 85-21    | SE           | VI-8         | 0654-1254        | 10                   | 191.12                                     | 1.5            | .008                              | .084                                    | .078                                  |
| 23  | 25-55                             | 86-09    | C            | VI-8         | 1330-1930        | 10                   | 191.15                                     | 3.5            | .018                              | .251                                    | .026                                  |
| 24  | 26-22                             | 86-57    | C            | VI-8/9       | 2007-0207        | 5                    | 189.43                                     | 11.0           | .058                              | .121                                    | .053                                  |
| 25  | 26-47                             | 87-41    | C            | VI-9         | 0241-0841        | 5                    | 184.93                                     | 5.0            | .027                              | .103                                    | .103                                  |
| 26  | 27-15                             | 88-29    | NC           | VI-9         | 0928-1543        | 10                   | 194.83                                     | 3.5            | .018                              | .103                                    | .041                                  |
| 27  | 27-38                             | 89-26    | NC           | VI-9         | 1620-2220        | 10                   | 185.32                                     | 13.0           | .070                              | .086                                    | .005                                  |
| 28  | 27-57                             | 90-27    | NC           | VI-9/10      | 2252-0452        | 5                    | 193.51                                     | 13.0           | .067                              | .171                                    | 1.411                                 |
| 29  | 27-57                             | 91-40    | NC           | VI-10        | 0527-1127        | 10                   | 195.63                                     | 4.0            | .020                              | .169                                    | .654                                  |
| 30  | 27-57                             | 92-45    | NW           | VI-10        | 1200-1700        | 10                   | 167.18                                     | 4.0            | .024                              | .233                                    | .185                                  |
| 31  | 28-02                             | 94-04    | NW           | VI-10/11     | 2111-0311        | 5                    | 168.88                                     | 8.0            | .047                              | .290                                    | .468                                  |
| 32  | 28-45                             | 94-14    | NW           | VI-11        | 0345-0715        | 5                    | 105.49                                     | 9.0            | .085                              | .683                                    | 2.104                                 |
| 33  | 29-13                             | 94-26    | NW           | VI-11        | 0931-1201        | 5                    | 77.52                                      | 5.0            | .064                              | .310                                    | 3.070                                 |

Table 15.--Station data, total volumes of plankton and volume of fish larvae and eggs, Cruise 11.  
(G-III sampler; speed of tows: 4-5 knots)

| Tow | 30-minute tows |          |          |              | Plankton                    |                      |                       |                          |                        |
|-----|----------------|----------|----------|--------------|-----------------------------|----------------------|-----------------------|--------------------------|------------------------|
|     | Position       |          | Sub-area | Date<br>1953 | Time<br>(start)<br>(C.S.T.) | Depth of<br>tow (m.) | Volume<br>in<br>(ml.) | No. of<br>Fish<br>Larvae | No. of<br>Fish<br>Eggs |
|     | N. Lat.        | W. Long. |          |              |                             |                      |                       |                          |                        |
| 1   | 29-12          | 93-35    | NW       | V-29         | 0430                        | 5                    | 44.0                  | 32                       | 265                    |
| 2   | 29-07          | 92-26    | NW       | V-29         | 1100                        | 15                   | 38.0                  | 31                       | 2850                   |
| 3   | 28-46          | 91-31    | NC       | V-29         | 1742                        | 15                   | 28.0                  | 33                       | 34                     |
| 4   | 28-42          | 89-48    | NC       | V-30         | 0608                        | 10                   | 63.5                  | 1043                     | 99                     |
| 5   | 29-07          | 88-47    | NC       | V-30         | 1315                        | 15                   | 18.0                  | 52                       | 26                     |
| 6   | 29-59          | 88-14    | NC       | V-30         | 1945                        | 5                    | 159.0                 | 115                      | 117                    |
| 7   | 30-09          | 87-07    | NC       | V-31         | 0215                        | 5                    | 36.0                  | 22                       | 4                      |
| 8   | 29-57          | 86-09    | NC       | V-31         | 0855                        | 15                   | 40.0                  | 83                       | 145                    |
| 9   | 29-27          | 85-10    | NE       | V-31         | 1529                        | 10                   | 37.5                  | 27                       | 168                    |
| 10  | 29-15          | 84-01    | NE       | V-31         | 2320                        | 5                    | 60.0                  | 159                      | 623                    |
| 11  | 28-23          | 83-37    | NE       | VI-1         | 0555                        | 15                   | 40.0                  | 206                      | 2063                   |
| 12  | 27-33          | 83-03    | NE       | VI-1         | 1222                        | 10                   | 80.0                  | 350                      | 395                    |
| 13  | 27-33          | 83-03    | NE       | VI-4         | 1013                        | 10                   | 110.0                 | 94                       | 353                    |
| 14  | 24-43          | 81-57    | SE       | VI-5         | 1055                        | 10                   | 86.0                  | 63                       | 233                    |
| 15  | 24-37          | 83-00    | SE       | VI-7         | 1353                        | 5                    | 7.0                   | 123                      | 352                    |

TABLE 15 (Continued)

| Tow | 30-minute tows |          |          |              |                             | Plankton             |                       |                          |                        |
|-----|----------------|----------|----------|--------------|-----------------------------|----------------------|-----------------------|--------------------------|------------------------|
|     | Position       |          | Sub-area | Date<br>1953 | Time<br>(start)<br>(C.S.T.) | Depth of<br>tow (m.) | Volume<br>in<br>(ml.) | No. of<br>Fish<br>Larvae | No. of<br>Fish<br>Eggs |
|     | N. Lat.        | W. Long. |          |              |                             |                      |                       |                          |                        |
| 16  | 25-07          | 84-03    | SE       | VI-7/8       | 2344                        | 5                    | 30.0                  | 32                       | 184                    |
| 17  | 25-25          | 84-55    | SE       | VI-8         | 0622                        | 10                   | 31.5                  | 66                       | 204                    |
| 18  | 25-41          | 85-45    | SE       | VI-8         | 1257                        | 10                   | 13.5                  | 182                      | 39                     |
| 19  | 26-08          | 86-34    | C        | VI-8         | 1934                        | 5                    | 40.0                  | 175                      | 17                     |
| 20  | 26-36          | 87-23    | C        | VI-9         | 0209                        | 5                    | 51.0                  | 68                       | 22                     |
| 21  | 27-00          | 88-00    | C        | VI-9         | 0843                        | 10                   | 10.0                  | 60                       | 77                     |
| 22  | 27-27          | 89-00    | NC       | VI-9         | 1546                        | 10                   | 29.5                  | 45                       | 29                     |
| 23  | 27-48          | 89-55    | NC       | VI-9         | 2221                        | 5                    | 48.0                  | 84                       | 102                    |
| 24  | 27-56          | 91-06    | NC       | VI-10        | 0455                        | 10                   | 41.0                  | 323                      | 95                     |
| 25  | 27-56          | 92-16    | NW       | VI-10        | 1128                        | 10                   | 20.0                  | 300                      | 167                    |
| 26  | 27-56          | 93-16    | NW       | VI-10        | 1722                        | 10                   | 33.0                  | 183                      | 102                    |
| 27  | 27-55          | 93-35    | NW       | VI-10        | 2040                        | 5                    | 28.0                  | 441                      | 3795                   |
| 28  | 28-24          | 94-09    | NW       | VI-11        | 0313                        | 5                    | 65.0                  | 374                      | 118                    |
| 29  | 29-07          | 94-16    | NW       | VI-11        | 0858                        | 5                    | 51.0                  | 288                      | 199                    |

TABLE 16 (A)

G-1A Net (Quantitative)

Plankton Volumes (ml./m<sup>3</sup>)

| Sub-area    | 0-100 fms.   |               |              | 100-1000 fms. |              |             | over 1000 fms. |              |             |
|-------------|--------------|---------------|--------------|---------------|--------------|-------------|----------------|--------------|-------------|
|             | Winter       | Spring        | Fall         | Winter        | Spring       | Fall        | Winter         | Spring       | Fall        |
| NW          | .055<br>(10) | .104<br>(14)  |              | .009<br>(2)   |              |             |                |              |             |
| NC          | .094<br>(6)  | .142<br>(17)  | .152<br>(3)  | .113<br>(4)   | .061<br>(11) | .074<br>(1) | .091<br>(2)    | .054<br>(4)  | .096<br>(6) |
| NE          | .040<br>(8)  | .146<br>(11)  |              | .025<br>(1)   | .063<br>(4)  |             | .056<br>(1)    |              |             |
| WC          |              | .065<br>(5)   |              |               | .029<br>(4)  |             |                | .008<br>(1)  |             |
| C           |              |               |              |               |              |             | .038<br>(9)    | .050<br>(8)  | .063<br>(1) |
| Ca          | .014<br>(3)  |               |              | .054<br>(3)   |              |             | .015<br>(1)    |              |             |
| SW          |              | .034<br>(7)   |              |               |              |             |                | .023<br>(4)  |             |
| SE          | .074<br>(12) | .135<br>(10)  | .191<br>(16) | .032<br>(5)   | .015<br>(1)  | .047<br>(1) | .049<br>(7)    | .055<br>(11) | .026<br>(1) |
| Means       | .060<br>(39) | .115<br>(64)  | .185<br>(19) | .054<br>(15)  | .053<br>(20) | .061<br>(2) | .047<br>(20)   | .047<br>(28) | .083<br>(8) |
| All Seasons |              | .109<br>(122) |              |               | .054<br>(37) |             |                | .052<br>(56) |             |

() No. of tows

Winter--12/21-3/20

Spring--3/21-6/20

Fall--9/21-12/20

TABLE 16 (B)

Fish Larvae (no./m<sup>3</sup>)

| Sub-area    | 0-100 fms.   |               |              | 100-1000 fms. |              |             | over 1000 fms. |              |             |
|-------------|--------------|---------------|--------------|---------------|--------------|-------------|----------------|--------------|-------------|
|             | Winter       | Spring        | Fall         | Winter        | Spring       | Fall        | Winter         | Spring       | Fall        |
| NW          | .188<br>(10) | .493<br>(14)  |              | .011<br>(2)   |              |             |                |              |             |
| NC          | .316<br>(6)  | .443<br>(17)  | .749<br>(3)  | .102<br>(4)   | .181<br>(11) | .080<br>(1) | .095<br>(2)    | .191<br>(4)  | .052<br>(6) |
| NE          | .176<br>(8)  | .429<br>(11)  |              | .025<br>(1)   | .187<br>(4)  |             | .034<br>(1)    |              |             |
| WC          |              | .696<br>(5)   |              |               | .025<br>(4)  |             |                | .032<br>(1)  |             |
| C           |              |               |              |               |              |             | .115<br>(9)    | .166<br>(8)  | .110<br>(1) |
| Ca          | .032<br>(3)  |               |              | .199<br>(3)   |              |             | .000<br>(1)    |              |             |
| SW          |              | .482<br>(7)   |              |               |              |             |                | .066<br>(4)  |             |
| SE          | .127<br>(12) | 1.142<br>(10) | .072<br>(16) | .046<br>(5)   | .068<br>(1)  | .076<br>(1) | .025<br>(7)    | .135<br>(11) | .020<br>(1) |
| Means       | .174<br>(39) | .585<br>(64)  | .182<br>(19) | .085<br>(15)  | .145<br>(20) | .078<br>(2) | .072<br>(20)   | .138<br>(28) | .055<br>(8) |
| All Seasons |              | .391<br>(122) |              |               | .117<br>(37) |             |                | .102<br>(56) |             |

Winter--12/21-3/20

Spring--3/21-6/20

Fall--9/21-12/20

() No. of tows

TABLE 16 (C)

Fish Eggs (no./m<sup>3</sup>)

| Sub-area    | 0-100 fms.    |                |              | 100-1000 fms. |              |             | over 1000 fms. |              |             |
|-------------|---------------|----------------|--------------|---------------|--------------|-------------|----------------|--------------|-------------|
|             | Winter        | Spring         | Fall         | Winter        | Spring       | Fall        | Winter         | Spring       | Fall        |
| NW          | .593<br>(10)  | 2.389<br>(14)  |              | .000<br>(2)   |              |             |                |              |             |
| NC          | .245<br>(6)   | 4.002<br>(17)  | .404<br>(3)  | .030<br>(4)   | .151<br>(11) | .006<br>(1) | .016<br>(2)    | .033<br>(4)  | .004<br>(6) |
| NE          | 1.686<br>(8)  | 1.285<br>(11)  |              | .025<br>(1)   | .077<br>(4)  |             | .011<br>(1)    |              |             |
| WC          |               | 2.006<br>(5)   |              |               | .040<br>(4)  |             |                | .040<br>(1)  |             |
| C           |               |                |              |               |              |             | .017<br>(9)    | .048<br>(8)  | .007<br>(1) |
| Ca          | .062<br>(3)   |                |              | .029<br>(3)   |              |             | .000<br>(1)    |              |             |
| SW          |               | .482<br>(7)    |              |               |              |             |                | .052<br>(4)  |             |
| SE          | 1.125<br>(12) | 1.916<br>(10)  | .166<br>(16) | .000<br>(5)   | .012<br>(1)  | .017<br>(1) | .005<br>(7)    | .043<br>(11) | .020<br>(1) |
| Means       | .886<br>(39)  | 2.301<br>(64)  | .204<br>(19) | .015<br>(15)  | .107<br>(20) | .012<br>(2) | .012<br>(20)   | .044<br>(28) | .006<br>(6) |
| All Seasons |               | 1.522<br>(122) |              |               | .065<br>(37) |             |                | .027<br>(56) |             |

Winter--12/21-3/20

Spring--3/21-6/20

Fall--9/21-12/20

() No. of tows

TABLE 17 (A)

G-III Net (Quantitative)

Plankton Volumes (ml./m<sup>3</sup>)

| Sub-area        | 0-100 fms.   |              | 100-1000 fms. |              | over 1000 fms. |              |
|-----------------|--------------|--------------|---------------|--------------|----------------|--------------|
|                 | Winter       | Spring       | Winter        | Spring       | Winter         | Spring       |
| NW              | .089<br>(3)  |              |               |              |                |              |
| NC              |              | .373<br>(2)  | .292<br>(2)   | .092<br>(9)  |                | .150<br>(1)  |
| NE              | .272<br>(2)  | .175<br>(8)  |               | .105<br>(2)  | .101<br>(1)    | .130<br>(1)  |
| C               |              |              |               |              | .129<br>(7)    | .111<br>(5)  |
| Ca              |              |              | .341<br>(1)   |              | .141<br>(1)    |              |
| SE              | .154<br>(8)  | .173<br>(4)  | .173<br>(3)   | .070<br>(3)  | .079<br>(3)    | .091<br>(8)  |
| Means           | .157<br>(13) | .203<br>(14) | .241<br>(6)   | .089<br>(14) | .114<br>(12)   | .104<br>(15) |
| Both<br>Seasons | .171<br>(27) |              | .135<br>(20)  |              | .109<br>(27)   |              |

() No. of tows

Winter--12/21-3/20

Spring--3/21-6/20

TABLE 17 (B)

Fish Larvae (no./m<sup>3</sup>)

| Sub-area     | 0-100 fms.   |               | 100-1000 fms. |              | over 1000 fms. |              |
|--------------|--------------|---------------|---------------|--------------|----------------|--------------|
|              | Winter       | Spring        | Winter        | Spring       | Winter         | Spring       |
| NW           | .454<br>(3)  |               |               |              |                |              |
| NC           |              | 1.558<br>(2)  | .146<br>(2)   | .458<br>(9)  |                | .129<br>(1)  |
| NE           | .240<br>(2)  | 3.032<br>(8)  |               | .282<br>(2)  | .220<br>(1)    | .467<br>(1)  |
| C            |              |               |               |              | .239<br>(7)    | .390<br>(5)  |
| Ca           |              |               | 2.056<br>(1)  |              | .427<br>(1)    |              |
| SE           | .854<br>(8)  | .686<br>(4)   | .808<br>(3)   | .238<br>(3)  | .118<br>(3)    | .253<br>(8)  |
| Means        | .667<br>(13) | 2.151<br>(14) | .795<br>(6)   | .386<br>(14) | .221<br>(12)   | .305<br>(15) |
| Both Seasons |              | 1.436<br>(27) |               | .509<br>(20) |                | .268<br>(27) |

Winter--12/21-3/20

Spring--3/21-6/20

() No. of tows

TABLE 17 (C)

Fish Eggs (no./m<sup>3</sup>)

| Sub-area        | 0-100 fms.   |               | 100-1000 fms. |              | over 1000 fms. |              |
|-----------------|--------------|---------------|---------------|--------------|----------------|--------------|
|                 | Winter       | Spring        | Winter        | Spring       | Winter         | Spring       |
| NW              | 2.234<br>(3) |               |               |              |                |              |
| NC              |              | 3.913<br>(2)  | .008<br>(2)   | .107<br>(9)  |                | .009<br>(1)  |
| NE              | 1.007<br>(2) | .581<br>(8)   |               | .008<br>(2)  | .036<br>(1)    | .029<br>(1)  |
| C               |              |               |               |              | .043<br>(7)    | .031<br>(5)  |
| Ca              |              |               | .021<br>(1)   |              | .042<br>(1)    |              |
| SE              | .641<br>(8)  | 1.655<br>(4)  | .004<br>(3)   | .106<br>(3)  | .012<br>(3)    | .028<br>(8)  |
| Means           | .988<br>(13) | 1.364<br>(14) | .008<br>(6)   | .093<br>(14) | .034<br>(12)   | .028<br>(15) |
| Both<br>Seasons |              | 1.183<br>(27) |               | .067<br>(20) |                | .031<br>(27) |

Winter--12/21-3/20

Spring--3/21-6/20

() No. of tows

Table 18.--Catches of G-IA and G-III nets compared, all seasons, all subareas.

| Depth<br>Zone          | Plankton (ml./m <sup>3</sup> ) |              | Fish Larvae (no./m <sup>3</sup> ) |       | Fish Eggs (no./m <sup>3</sup> ) |       |
|------------------------|--------------------------------|--------------|-----------------------------------|-------|---------------------------------|-------|
|                        | G-IA                           | G-III        | G-IA                              | G-III | G-IA                            | G-III |
| 0-100 fms.<br>Tows     | .109<br>(122)                  | .171<br>(27) | .391                              | 1.436 | 1.522                           | 1.183 |
| 100-1000 fms.<br>Tows  | .054<br>(37)                   | .135<br>(20) | .117                              | .509  | .065                            | .067  |
| over 1000 fms.<br>Tows | .052<br>(56)                   | .109<br>(27) | .102                              | .268  | .027                            | .031  |

( ) No. of tows

